

Report No. UT-04.28

ESTIMATION OF COMPRESSION PROPERTIES OF CLAYEY SOILS, SALT LAKE VALLEY, UTAH

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Inside Cover

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16. Abstract This report shows that the compressibility properties (Cc and CR) of the lake deposits found in the Salt Lake Valley can be reasonably predicted from the natural moisture content and the initial void ratio. Analyses are performed and regression equations developed using geotechnical data obtained from the I-15 Reconstruction Project in Salt Lake City, Utah.			
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1 Introduction

As a new embankment load is applied to a saturated, fine-grained, clayey soil, the soil will settle by a process known as consolidation. Consolidation is typically classified as primary consolidation settlement and secondary consolidation settlement. Primary consolidation settlement occurs when excess pore water pressure dissipates from the soil layer under the embankment into the surrounding soil. This gradual dissipation of excess pore water produces a corresponding decrease in the soil's void ratio as the soil consolidates.

Predicting the amount of primary consolidation settlement is important for many civil engineering projects. This is especially true in much of Utah because of the widespread presence of compressible soils in urban areas along the Wasatch Front. The surface settlement resulting from primary consolidation settlement may range from a few centimeters up to several meters, depending on the thickness of the clay deposit, its previous load history (preconsolidation stress) and the magnitude of the increased stress caused by the new embankment load.

The compressibility of lacustrine (i.e., lake) deposits along the Wasatch Front is well documented by laboratory testing and field settlement measurements. The most extensive study of these soils was completed in 1996 through 2002 along the I-15 and I-80 corridors by the Utah Department of Transportation (UDOT) and its geotechnical consultants as part of the I-15 Reconstruction Project. Figure 1 shows a typical geotechnical profile for the downtown Salt Lake City at the I-15 alignment. In this profile, the upper 6 m (20 ft) consists of Holocene alluvium comprised of sands, silts, and clays transported by streams and rivers from nearby canyons of the Wasatch Mountains. The alluvial deposits are underlain by about 10 m (33 ft) of soft, compressible sediments that belong to Pleistocene age Lake Bonneville. This lake was a fresh water predecessor of the Great Salt Lake and was present in northern Utah from about 30,000 years to 10,000 years ago. This approximate 10-m (33-ft) thick lacustrine unit consists of clays and silts with interbedded fine sand. The upper 3 to 5 m (10 to 16 ft) of this unit is highly plastic (CH, MH) with lesser amounts of low plastic clays and silts (CL, ML) and thin beds of sand (SM). The middle and lower parts of the Lake Bonneville deposits have higher silt content with frequent thin beds of sands. Beneath the Lake Bonneville deposits, at a depth of about 16 m to 18 m (52 to 59 ft), is a complex sequence of interbedded sand, silts and clay. The upper part of this interval consists of dense Pleistocene alluvium that predates Lake Bonneville and extends to a depth of about 23 m (75 ft). Below the Pleistocene alluvium are additional lacustrine deposits from the Pleistocene

Cutler Dam Lake sequence. This lake was a smaller, freshwater lake that formed in the Salt Lake Valley prior to Lake Bonneville and is comprised of clay, silt and inter-bedded sand units.

Most of the consolidation settlement associated with embankment construction in the Salt Lake Valley results from compression of the recent alluvium and the underlying lacustrine deposits of Lake Bonneville and the Cutler Dam sequence. Settlement records from the 1960's I-15 embankment construction showed that these sediments initiate primary consolidation settlement when approximately 2 to 3 meters (7 to 10 ft) of embankment is placed over existing ground.

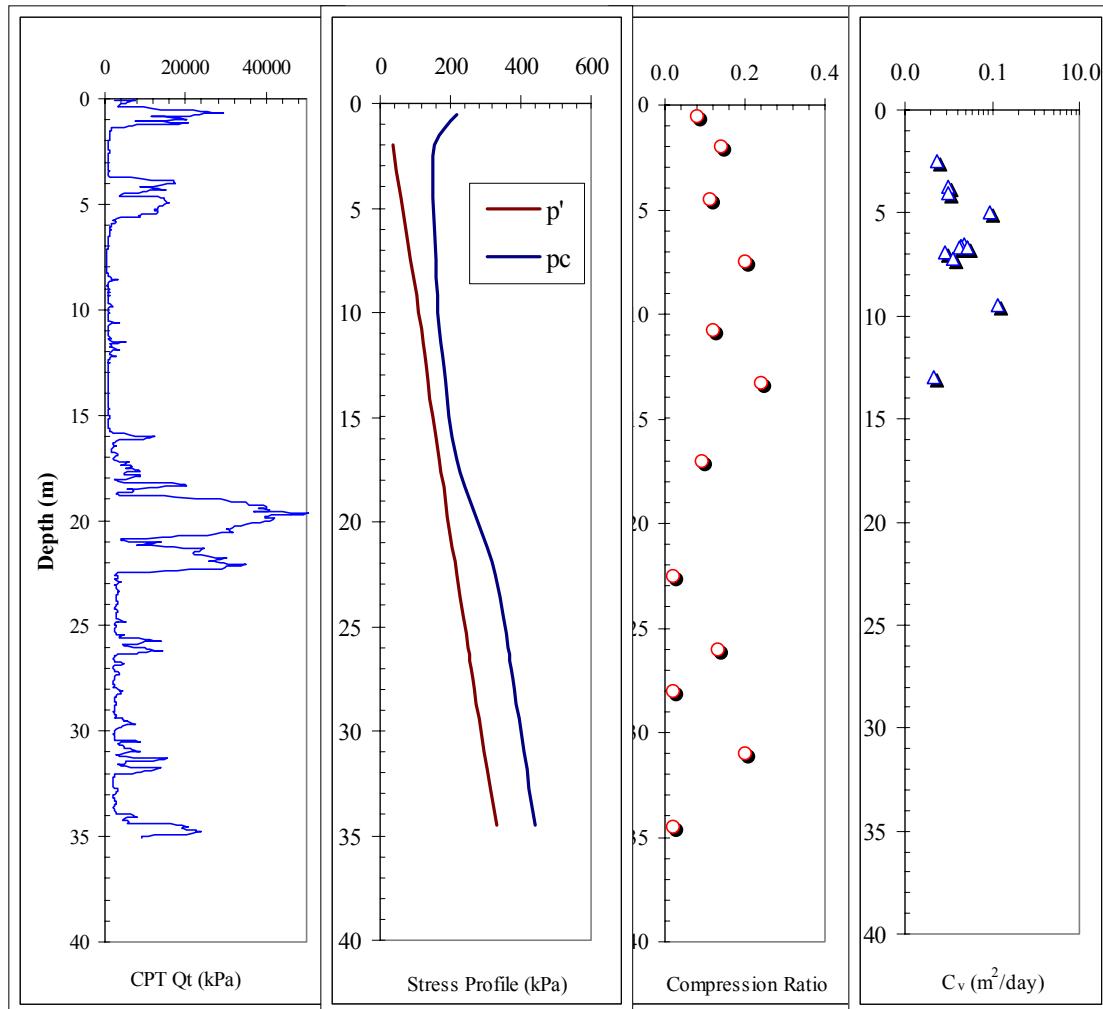


Figure 1. Sample geotechnical profile for downtown Salt Lake City at I-15.

When primary consolidation is triggered, the resulting settlement can be as large as 10 to 15 percent of the amount of embankment placed. For example, a 10-m (33 ft) high embankment typically undergoes about 1 to 1.5 m (3 to 5 ft) of consolidation settlement from compression of the foundation soils. In addition to the large amount of primary consolidation settlement, the duration of consolidation settlement is relatively long, requiring up to 2 to 3 years to complete, depending on the location, compressibility and thickness of the underlying sediments. Thus, the time-rate of primary consolidation is an important design and construction consideration.

In contrast to primary consolidation, secondary consolidation is a long-term form of settlement that occurs under a constant vertical effective stress (i.e., the vertical effective stress is not changing with time). In secondary consolidation, the excess pore pressure associated with primary consolidation has essentially dissipated, thus secondary consolidation is a decrease in void ratio change that occurs after primary consolidation, and progresses under a constant vertical effective stress. Secondary consolidation is characterized by a continuing decrease in void ratio resulting from rearrangement of the soil fabric with time. The magnitude of secondary consolidation usually diminishes with time on a settlement versus log of elapsed time plot. Secondary consolidation is also referred to as creep settlement. In general, secondary consolidation settlement is much smaller than primary consolidation settlement and ranges from a few centimeters to a few tens of centimeters during the lifetime of bridge structure.

Geotechnical design engineers must answer three important questions when estimating the impact that consolidation settlement has on engineering projects. (1) What is the amount of the expected primary settlement? (2) How long will it take for primary consolidation to occur? (3) Will the amount of secondary consolidation be small enough so as not to damage or decrease the serviceability of the structure? The first question is important because excessive settlement can damage newly constructed bridges or adjacent facilities such as highway pavement, walls and nearby buildings. The second question is also important, if the construction schedule is impacted by the time required for primary consolidation. For example, construction of bridges and pavement cannot be completed until most of the primary consolidation settlement has occurred. Thus, a project may be delayed, if the duration of primary consolidation is long. The last question affects the long-term performance of the structure. During the life cycle of a structure or pavement, it is important to verify that the amount of secondary settlement will not be deleterious. Surcharging (i.e., preloading) of the compressible soils has been the primary method used by geotechnical

engineers in the Salt Lake Valley to reduce the amount of secondary settlement to tolerable levels. Surcharging can significantly reduce the rate and amount of secondary consolidation settlement (Saye and Ladd, 1999).

2 Purpose of Research

This research presents correlations that are useful in answering question number one (1) above. The University of Utah Department of Civil and Environmental Engineering has contracted with the Utah Department of Transportation Research Division to evaluate the performance of innovative foundation treatments and embankment construction used on the I-15 Reconstruction Project. Part of that research contract requires the evaluation of methods of estimating the compressibility of the soil from field and laboratory data. In a concurrent report (UDOT Research Report No. UT-03.20, Bartlett and Alcorn, 2004), an attempt was made to correlate the compressibility of the lake deposits with in situ measurements made from the cone penetrometer (CPT). Unfortunately, these CPT correlations did not produce very reliable predictive equations for soil compressibility (i.e., compression index and compression ratio). The coefficient of determination, R^2 , for the regression equations was about 20 percent for the best regression equations. (An R^2 value of 20 percent means that 20 percent of the variability in compressibility is being explained by the CPT measurements). This relatively low R^2 value was disappointing. Thus, these relations were not deemed reliable enough to be used for design purposes. It was also concluded that the CPT is not a very reliable tool for predicting compressibility (i.e., C_c and CR) when used in isolation without other means of verification.

However, this was not true for the preconsolidation stress, σ_p' . The preconsolidation stress can be determined reliably from the CPT data. A relatively robust regression equation was developed for σ_p' from the CPT measurements and field measurements of settlement (Bartlett and Alcorn, 2004).

This report is a continuation of research by Bartlett and Alcorn (2004). It uses soil index properties, void ratio and moisture content tabulated by Bartlett and Alcorn (2004) to develop regression equations for predicting the compression index and compression ratio for the clayey lake deposits in the Salt Lake Valley.

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3 Previous Research

Previous researchers have developed empirical equations relating compression index, C_c , and compression ratio, CR, with index properties such as liquid limit, LL (%), initial void ratio, e_0 (unitless), natural water content, W_n (%), and plasticity index, PI (%). In general, it has been found that the compressibility of the soil increases with increasing plasticity and void ratio. Also, the LL, PI and void ratio are reasonably correlated with the natural water content for saturated soils.

The use of the above soil properties to predict soil compressibility is desirable because the measurement of these properties does not require a large amount of laboratory time or expense, when compared to oedometer (consolidation) testing. If reliable correlations can be found, then a significant cost savings can be realized during many geotechnical investigations. The scope of the geotechnical laboratory program can be reduced to a confirmatory investigation of the consolidation properties; hence reducing the amount of required oedometer testing.

There are many published equations for estimating C_c in the geotechnical literature (EPRI, 1990). Perhaps the most widely used is that of Terzaghi and Peck (1967) for normally consolidated (i.e., NC) clay:

$$C_c = 0.009 (LL - 10)$$

3-1

This relation, along with many others, is shown in Figure 2. This research seeks to produce similar types of relations that have been specifically developed and calibrated to the lacustrine clays found in the Salt Lake Valley.

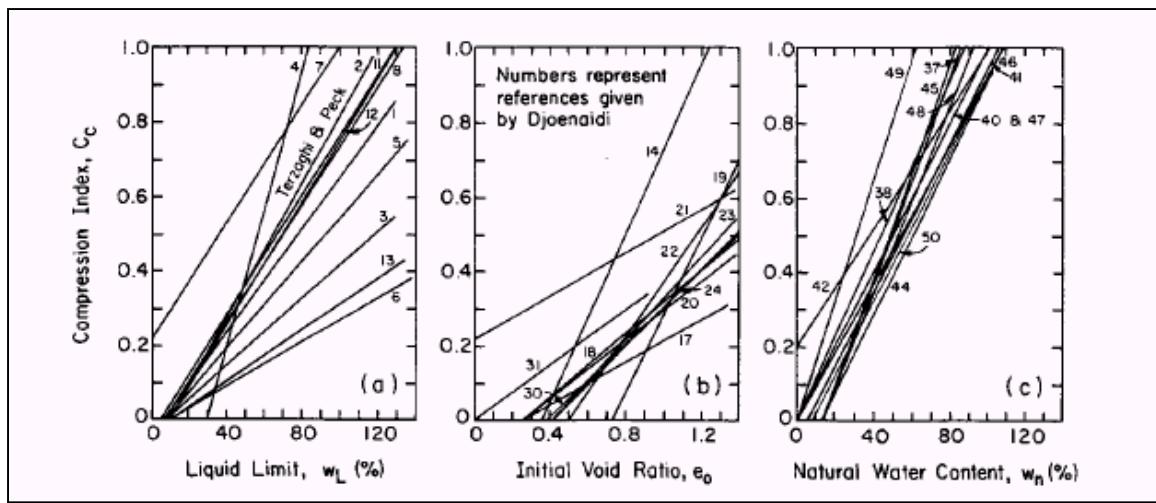


Figure 2. Representative C_c relationships for cohesive soils (Djoenaidi, 1985).

4 1-D Consolidation Theory and Applicable Soil Properties

The equation from 1-D consolidation theory for estimating the amount of primary settlement, S_c , from the compression index, C_c , for a normally consolidated clay is:

$$S_c = [C_c / (1+e_0)] * H_0 * \log [(\sigma'_{vo} + \Delta \sigma_{v1}) / \sigma'_{vo}] \quad 4-1$$

where H_0 is the initial thickness of the clay layer, e_0 is the initial void ratio, σ'_{vo} is the initial effective vertical stress (prior to the new load) and $\Delta \sigma_{v1}$ is the increase in vertical stress above σ'_{vo} caused by the application of the new load.

For an overconsolidated clay, equation 4-1 can be rewritten to:

$$S_c = [C_r / (1+e_0)] * H_0 * \log [(\sigma_p / \sigma'_{vo}) + [C_c / (1+e_0)] * H_0 * \log [(\sigma_p + \Delta \sigma_{v2}) / \sigma_p] \quad 4-2$$

where C_r is the recompression index, σ_p is the preconsolidation stress and $\Delta \sigma_{v2}$ is the increase in vertical stress above the preconsolidation stress.

The above equations are often rewritten with the compression ratio, CR, substituted for the term $[C_c / (1+e_0)]$. Values of CR are the strain for 1 log cycle increase in vertical stress.

As we can see from the above equations, we need to know C_c or CR to calculate the amount of settlement from one-dimensional primary consolidation theory. For laboratory results, values of C_c can be determined from a graphical construction procedure using a plot of void ratio and applied vertical effective stress (Figure 3). The compression index, C_c , is the slope of the virgin compression curve when the test results are plotted in terms of the void ratio versus logarithm of effective vertical stress. The compression ratio, CR, is the slope of the virgin compression curve when the test results are plotted as vertical strain versus the logarithm of effective vertical stress.

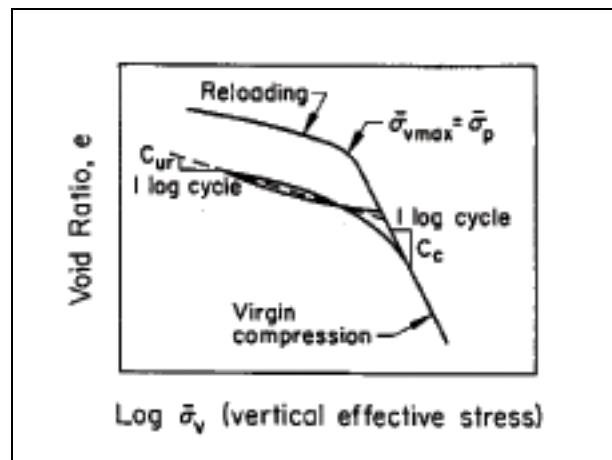


Figure 3. Consolidation behavior.

5 Data and Analysis Methods

5.1 Screening Laboratory Data for Sampling Disturbance

The goal of this research is to develop empirical equations to predict C_c and CR for the lacustrine clay deposits of the Salt Lake Valley. The empirical equations given herein will be developed using laboratory consolidation tests that were performed by various geotechnical consultants for the I-15 Reconstruction Project (Dames and Moore, 1996a, b, c; Kleinfelder, 1996a, b, c, d). The tabulated laboratory data is presented in Appendix 1.

However, before this data can be used in the statistical analysis it is important to eliminate those tests that have been strongly influenced by sampling disturbance. Most of the borings for the I-15 Reconstruction Project were done using hollow stem augers and Shelby tube sampling and show some signs of sample disturbance. However, the effect of sample disturbance and its consequences can be minimized using the screening criteria developed by the Norwegian Geotechnical Institute (Anderson and Kolstad, 1979) as shown in Table 1. This screening is an important part of data evaluation because the laboratory values of preconsolidation stress (σ_p') and undrained strength (S_u) are reduced by sample disturbance and values of C_c and CR are increased.

For this research, data with poor to very poor sample quality designations (SQD) (Table 1) were eliminated from the statistical analyses and regression. The SQD is calculated by obtaining the vertical strain obtained from a standard oedometer test at a vertical pressure equal to the in situ vertical effective stress (σ_v') calculated for the appropriate field conditions. Thus a SQD of 4 percent means that the oedometer sample strained 4 percent upon reaching a vertical stress that is equal to σ_v' . All data were removed from the analysis that had a SQD of 4 percent or greater.

Table 1. Sample quality designation versus strain (%) on reloading to σ'_{vo} .

Strain (%) on Reloading to σ'_{vo}	Sample Quality Designation (SQD)
<1	VERY GOOD TO EXCELLENT
1-2	GOOD
2-4	FAIR
4-10	POOR
>10	VERY POOR

5.2 Field Correction of Compression Ratio

A correction to the virgin compression curve is required to minimize the effects of sample disturbance as developed by Schmertmann (1955). The Schmertmann correction allows for disturbance of the clay due to sampling, transportation, and storage of the sample plus subsequent trimming and reloading during the consolidation test. This correction allows for a more direct comparison between compressibility measured in the laboratory oedometer test with that measured in the field by the magnetic extensometers.

The laboratory consolidation curves and properties compiled in Appendix 1 were corrected to a “field consolidation curve” as shown in Figure 4. The Schmertmann (1955) correction procedure for overconsolidated soil, as given in Holtz and Kovacs (1981), is described below. (The overconsolidation construction was selected because experience has shown that the clays along the I-15 alignment are overconsolidated.)

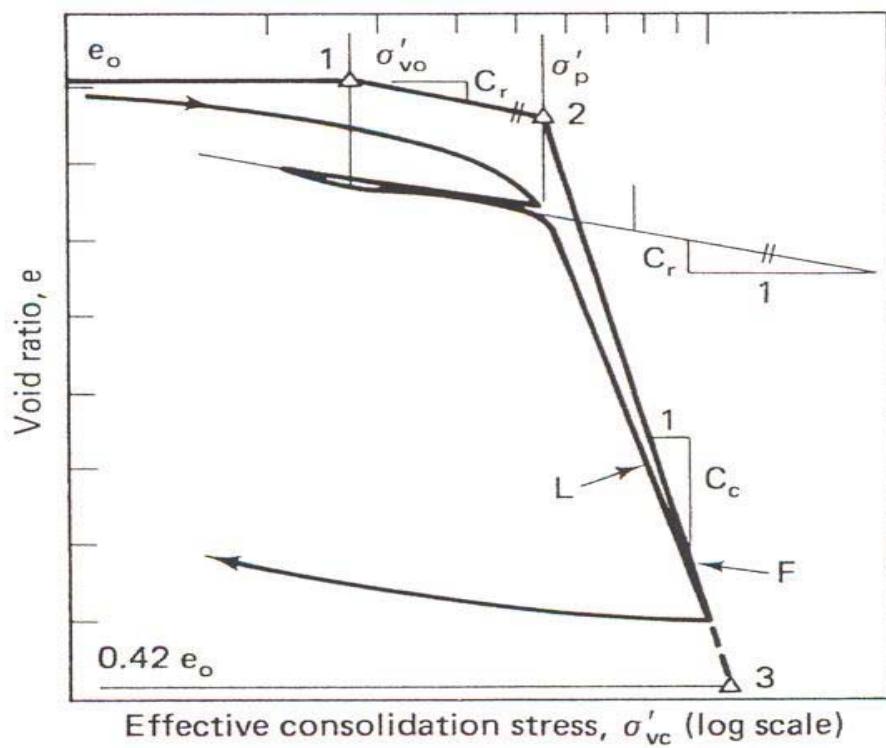


Figure 4. Schmertmann procedure for overconsolidated soils (after Holtz and Kovacs, 1981).

1. Perform the Casagrande (1936) construction and evaluate the preconsolidation pressure σ'_p
2. Calculate the initial void ratio e_o . Draw a horizontal line from e_o , parallel to the log effective stress axis, to the existing vertical overburden pressure σ'_{vo} . This establishes control point 1, illustrated by triangle 1 in Fig. 4.
3. From control point 1, draw a line parallel to the rebound-reload curve to the preconsolidation pressure σ'_p . This will establish control point 2, as shown by triangle 2 in Fig. 4.
4. From a point on the void ratio axis equal to 0.42 e_o , draw a horizontal line, and where the line meets the extension of the laboratory virgin compression curve L, establish a third control point, as shown by triangle 3. The coefficient of e_o is not a “magic number,” but is a result of many observations on different clays.
5. Connect control points 1 and 2, and 2 and 3 by straight lines. The slope of the line F joining control points 2 and 3 defines the compression index C_c for the field virgin compression curve. The slope of the line joining control points 1 and 2 of course represents the recompression index C_r .

Schmertmann (1955) describes the assumption made in using a 0.42 e_o value for the anchor point (i.e., virgin-slope intersection point) of the field curve (Figure 4). Because the intersection of the field initial virgin slope with the initial virgin slopes of laboratory consolidation tests ranges from about 40 to 46 percent of the sample’s initial void ratio, e_o , Schmertmann (1955) recommended that an initial virgin-slope intersection point at 42 percent of e_o be used as a reasonable estimate for most clays.

Because the Kleinfelder (1996a, b, c, d) consolidation curves were reported in terms of vertical strain, ϵ , and not void ratio, e , the following relations were used in applying the Schmertmann (1955) technique to Kleinfelder’s data:

$$e_f = 0.42 e_o \quad 5-1$$

$$\Delta e = e_o - 0.42 e_o \quad 5-2$$

$$\Delta e = 0.58 e_o \quad 5-3$$

$$\epsilon = \Delta e / (1 + e_o) \quad 5-4$$

$$\epsilon = 0.58 e_o / (1 + e_o) \quad 5-5$$

Using the equivalent of Δe written in terms of strain (Eq. 5-4) made it possible to correct the Kleinfelder consolidation curves using the Schmertmann (1955) technique. Also for these data, the slope of the field corrected virgin compression curve produces the compression ratio,

CR, instead of the compression index, C_c . However, the two definitions of slopes can be related by the following:

$$C_c = CR * (1 + e_0) \quad 5-6$$

Figure 4 is an example of the correction method outlined above, as applied to a compression curve obtained from the Kleinfelder (1996a, b, c, d) consolidation curves.

When a vertical stress versus void ratio consolidation curve is used (e.g., Dames and Moore consolidation curves), then C_c can be corrected to a field C_c value without applying Equations 5-1 through 5-5. The field corrected C_c value can then be converted to a field corrected CR value by using Equation 5-6. (Another symbol used for CR is C_e (Holtz and Kovacs, 1981. However, the remainder of this text uses the symbol CR, which is meant to be a field corrected virgin compression ratio.)

5.3 Calculation of Moisture Content from Void Ratio

The data presented in Appendix 1 do not have moisture content, W_n , values for the oedometer samples performed by the various geotechnical laboratories. Thus, W_n values were estimated in Appendix 1 using:

$$S * e = W_n * G_s \quad 5-7$$

where S is the degree of saturation (decimal fraction), e is the void ratio and G_s is the specific gravity. For this equation, S equal to 1.0 (i.e., the soil is saturated) was used, and a G_s value equal to 2.75 was assumed, which is a typical value for clayey soils.

5.4 Simple Linear Regression

In this section, simple linear regression (SLR) method is used to calculate a best-fit line for the I-15 oedometer data and the index properties. SLR is a statistical method for analyzing the relationship between two variables, X and Y . The X variable is the independent variable (i.e., the variable used to predict the Y variable). The X variable is also called the “predictor variable.” The Y variable is the dependent variable (i.e., the variable that is to be predicted by the X variable).

In this study, the X variables are: LL, e_o , W_n and PI. The Y variables that we considered are C_c and CR. Knowing X and a corresponding Y value, we wanted to find the best-fit line through the data. The goal of SLR is to find the value of intercept and slope of the line that best predicts Y from X. The form of the regression equation is commonly written as:

$$Y = \beta_0 + \beta_1 X \quad 5-8$$

where β_0 and β_1 are the intercept and slope of the regression equation, respectively.

In short, the regression procedure finds estimates of the β_0 and β_1 coefficients by a minimization process. This is done by minimizing the sum of squares of the vertical distances between the data points and the best-fit line in X-Y space. This is also equivalent to minimizing the variance between the best-fit line and the Y values.

The predictive performance of the SLR line is judged by the coefficient of determination, R^2 . For example an R^2 value of 0.5 means that 50 percent of the variation in Y is being explained by the X variable. R^2 values vary between 0.0 and 1.0. An R^2 value of 0.0 means that the X variable has no predictive advantage (i.e., there is no correlation between X and Y). An R^2 value of 1.0 means that the X variable is a perfect predictor of Y, with no variation (i.e., there is a perfect correlation between X and Y). We have used R^2 values to judge the relative predictive performance of the SLR models that are presented in the next section.

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6 Analysis

Figures 5 through 12 show the results of the regression analyses. These regressions were performed on CR and C_c for LL, e_o , PI and W_n , respectively.

Table 2 gives the R^2 values for each of the regressions shown in Figure 5 through 12. In general, regression equations that used C_c as the dependent variable had higher R^2 values than those that used CR. This is expected because CR is really a function of C_c and an additional variable e_o (i.e., $CR = C_c / (1 + e_o)$). This use of a second variable (i.e., e_o) to calculate CR introduces more variability in the regression process, hence lower R^2 values are obtained for these regressions.

Table 2. Comparison of R^2 values from the regression analysis.

		Dependent Variables	
		CR	C_c
Independent Variables	LL	$R^2 = 0.25$	$R^2 = 0.31$
	e_o	$R^2 = 0.46$	$R^2 = 0.66$
	PI	$R^2 = 0.14$	$R^2 = 0.18$
	W_n	$R^2 = 0.44$	$R^2 = 0.66$

It should be noted that regression using e_o and W_n have the best predictive power as judge by R^2 (Table 2). Thus, void ratio and natural water content are the best estimators of CR and C_c . Also note that the R^2 values for the regression using e_o and W_n yielded the same R^2 values. The reason for this is that W_n was calculated from e_o using Equation 5-7, thus these regressions are essentially the same, because W_n and e_o are related by a constant value.

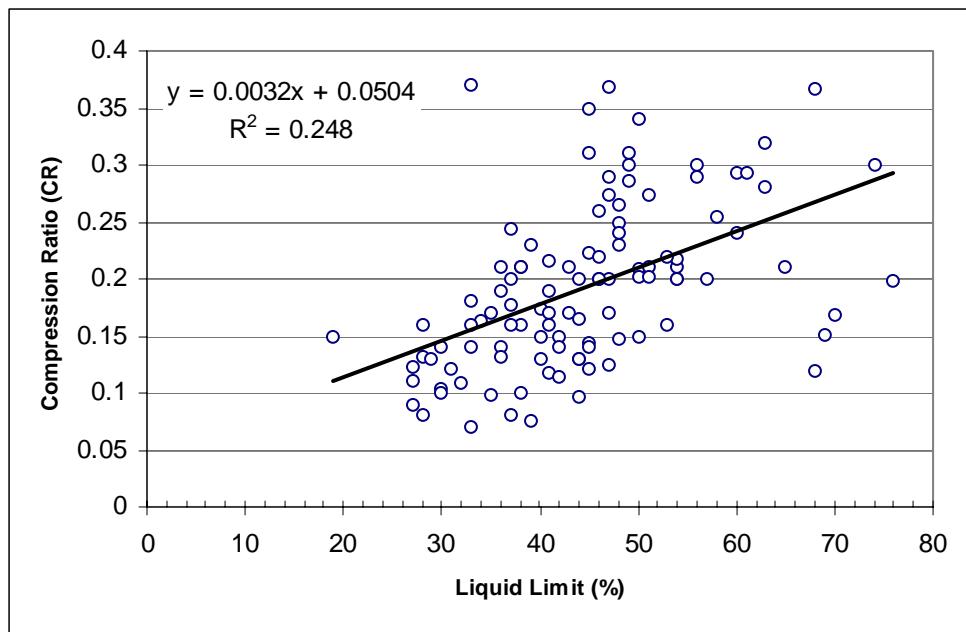


Figure 5. Liquid limit versus compression ratio relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

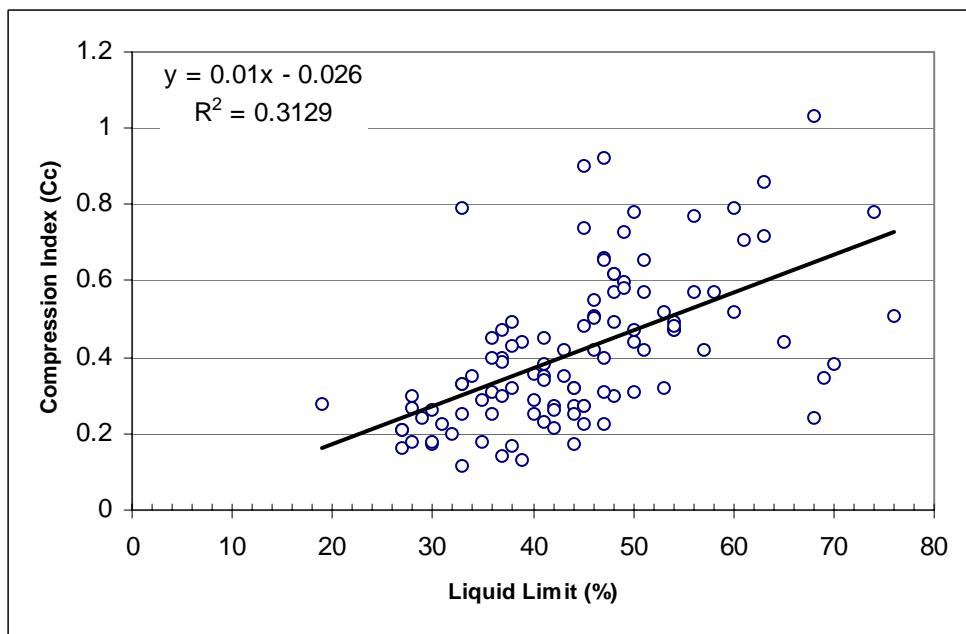


Figure 6. Liquid limit versus compression index relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

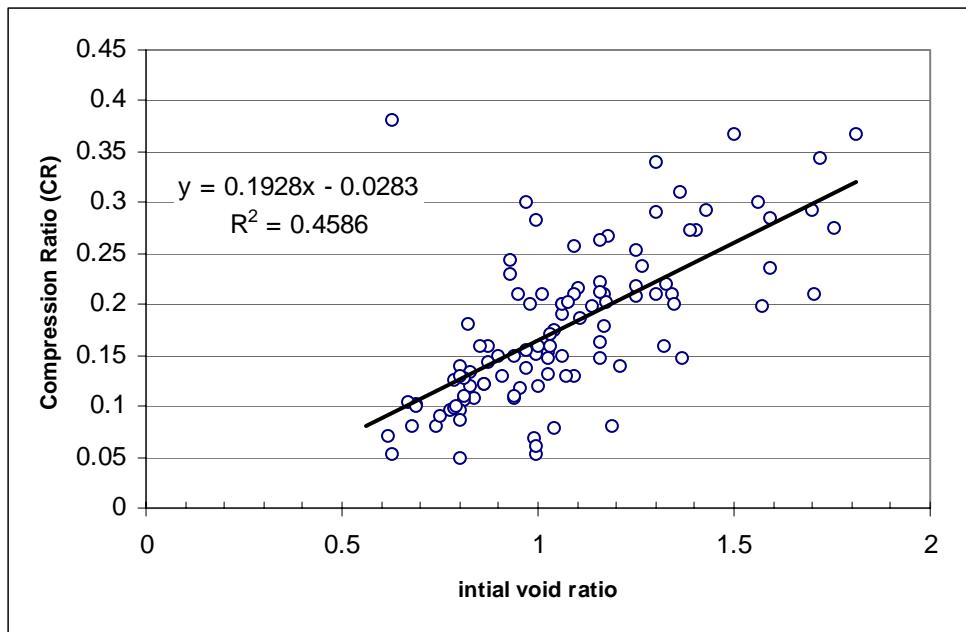


Figure 7. Void ratio versus compression ratio relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

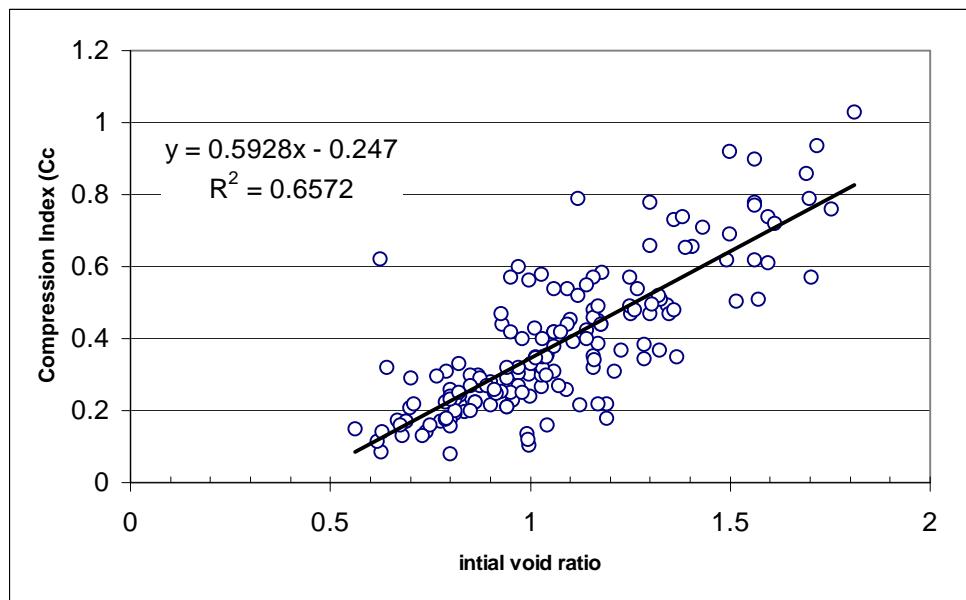


Figure 8. Void ratio versus compression index relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

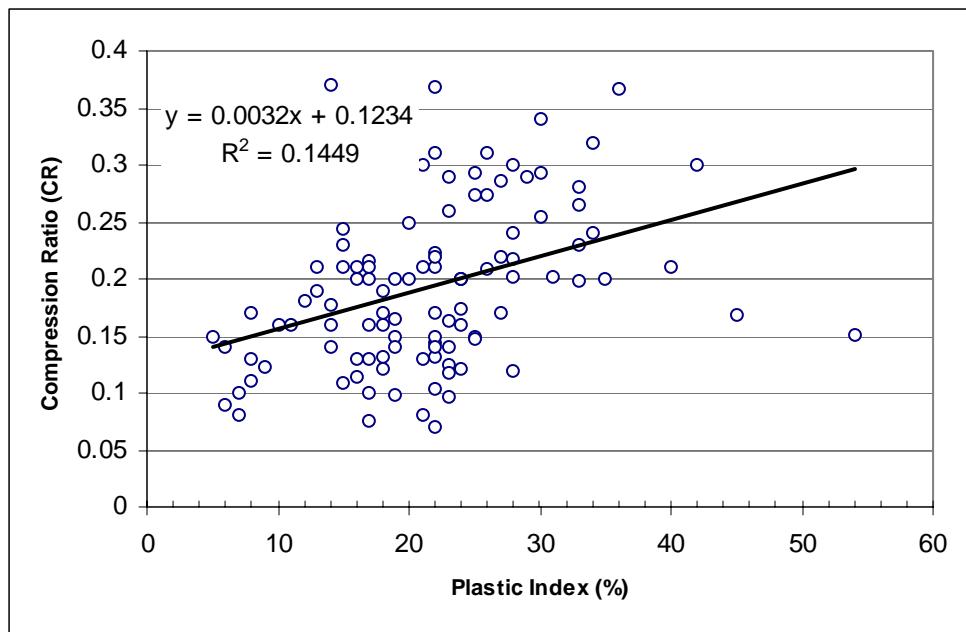


Figure 9. Plasticity index versus compression ratio relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

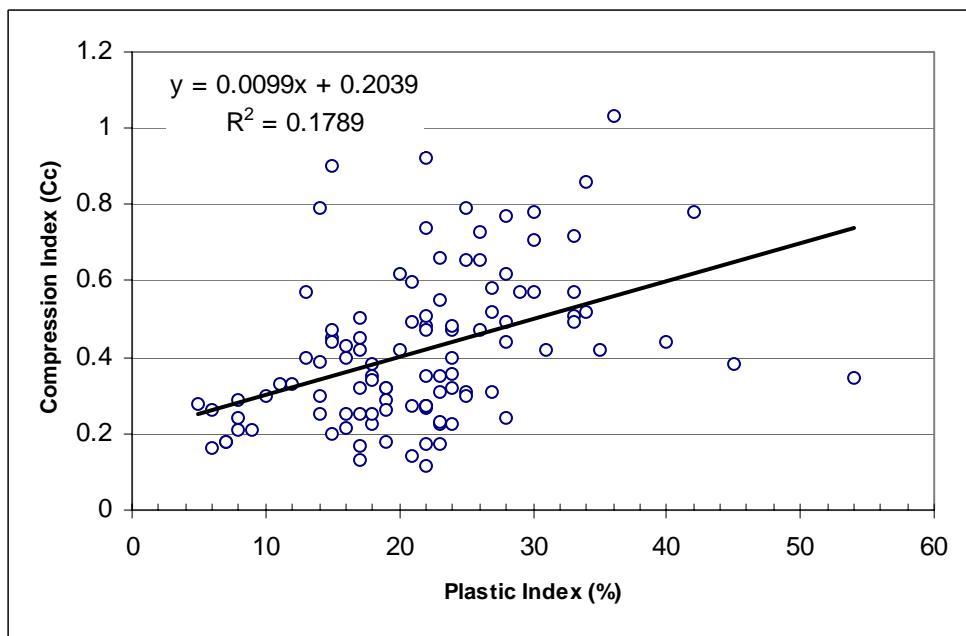


Figure 10. Plasticity index versus compression index relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

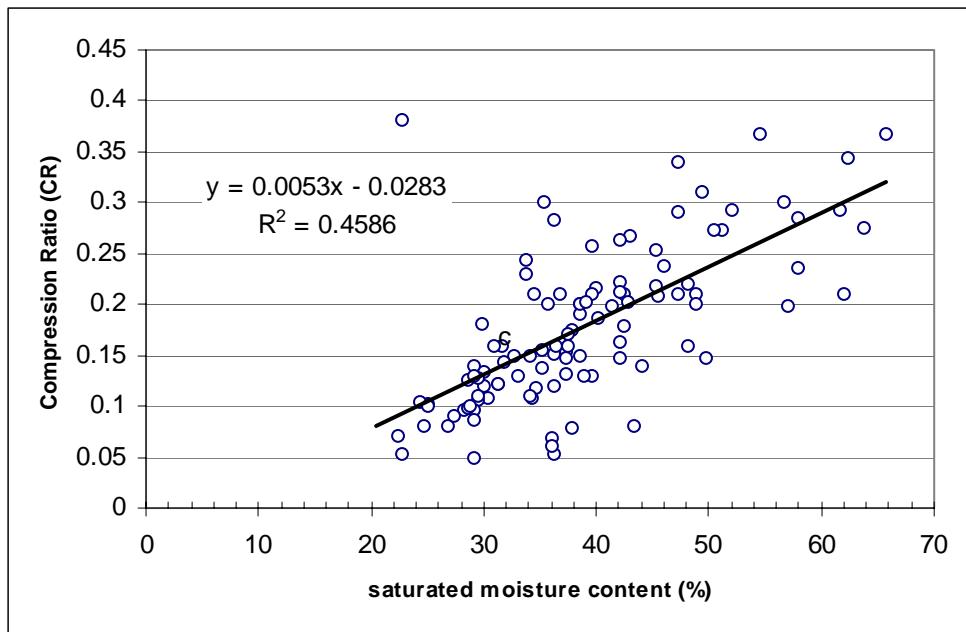


Figure 11. Moisture content versus compression ratio relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

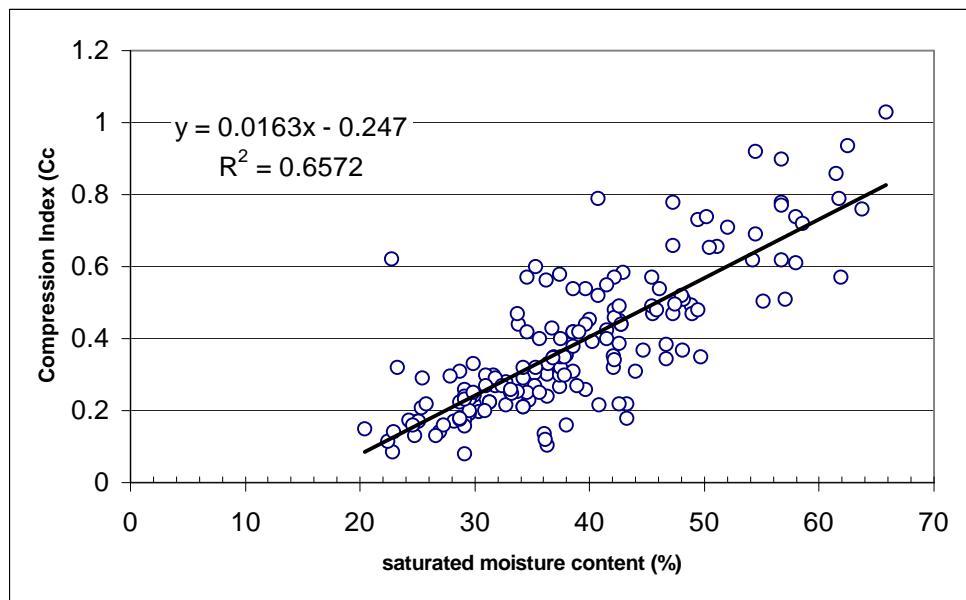


Figure 12. Moisture content versus compression index relations for the lacustrine (lake) deposits in Salt Lake Valley, Utah.

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7 Comparison with Previous Work

For comparison purposes, the results from the previous section have been plotted against relations for predicting CR and C_c from other studies (Djoenaidi, 1985). The Salt Lake Valley regression lines are plotted as the I-15 data line (heavy black line ending with an asterisk) in Figure 13.

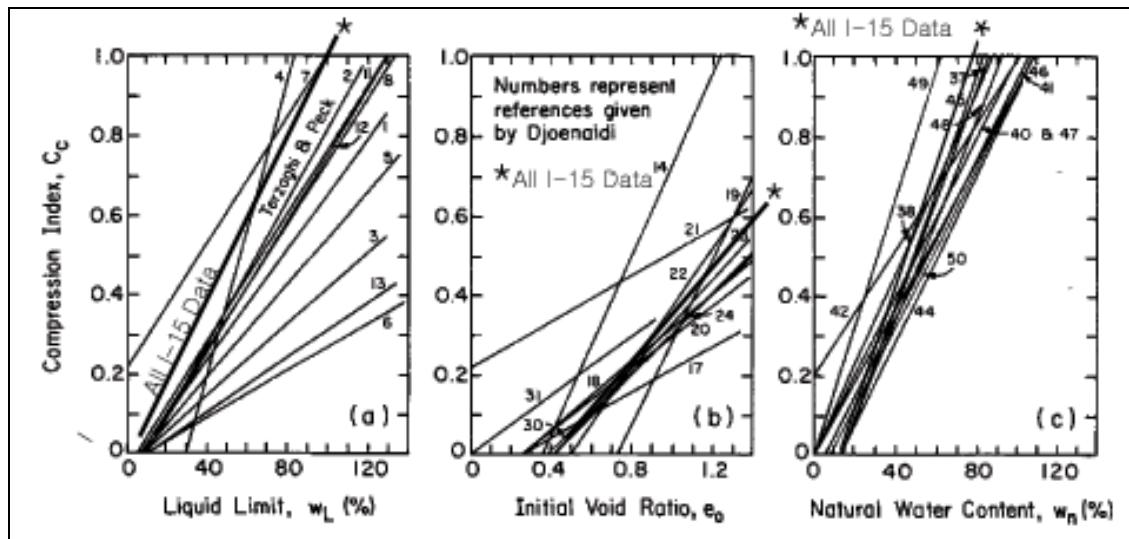


Figure 13. Representative C_c relationships for cohesive soils (Source: Djoenaidi (1985)).

From Figure 13 it can be seen that the I-15 regression of C_c versus e_0 and W_n are in reasonable agreement with the relations published in Djoenaidi (1985). However, when the LL relation is closely examined, we note that the Salt Lake Valley lacustrine deposits are more compressible at relatively low LL values (see Figure 13, C_c vs. LL plot). (Note that in this plot, relatively low LL values of the I-15 data have relatively high C_c , when compared with other relations.) The reason for this higher than average compressibility for relatively low LL values is not readily apparent, but may be partly attributable to the calcareous nature of the Lake Bonneville Deposits. (These deposits are calcareous silty clays and clay silts which are partly composed of small shell fragments. The relatively high void ratio (i.e., high compressibility) may be a result of dissolutioning of the carbonate shell fragments found in the soil fabric.)

The C_c versus e_0 plot shows that the Salt Lake Valley clayey soils have C_c values that are relatively typical when compared with other published relations (Figure 13). Likewise, the plot of C_c versus W_n plot shows that this relation for the Salt Lake Valley clayey soils is

reasonably similar to other published relations (Figure 13); however, the Bonneville soils do appear to be slightly more compressible for the same W_n value. Also, it is interesting to note that relations that use W_n have smaller differences in the regression lines when compared with LL and e_o regression lines (Figure 13). This suggests that in general W_n is a more reliable predictor than LL and PI. This was true for the I-15 data, where regressions based on W_n yielded higher R^2 values than those based on LL and PI. Thus, it is recommended that W_n be used to estimate CR and C_c , whenever possible. Also, e_o is a good predictor of CR and C_c for the I-15 data and can be used as an alternative.

8 Recommendations and Conclusions

The compressibility properties (C_c and CR) of the lake deposits in the Salt Lake Valley can be reasonably predicted by the natural moisture content, W_n , and the initial void ratio, e_o . Regression equations using these soil properties yield R^2 values of about 45 to 65 percent. This predictive performance is considered sufficient for use in preliminary design and to supplement laboratory investigations at sites where laboratory data are limited. The final regression equations are:

$$CR = 0.0053 W_n - 0.0283 \quad 8-1$$

$$C_c = 0.0163 W_n - 0.247 \quad 8-2$$

where CR is the compression ratio, C_c is the compression index and W_n is the natural moisture content (%). Alternatively, the initial void ratio, e_o , can be used to predict CR and C_c . These relations have similar predictive performance as those using W_n . The equations are:

$$CR = 0.1928 e_o - 0.0283 \quad 8-3$$

$$C_c = 0.5928 e_o - 0.247 \quad 8-4$$

However, the use of e_o is less desirable than W_n , not because of its poorer predictive power, but because e_o requires more effort to measure in the laboratory than W_n .

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Appendix 1 – Tabulated Data

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Type of Data and Location	Boring	Depth (m)	Preconsol. Pressure (kPa)	Effective Vertical Stress(kPa)	Dry Density (kNm/M^3)	Initial Void Ratio	Field Cc	Field Cf	Liquid Limit	Plastic Index	%Strain @ Ver	Offset Meters	Northing Meters	Easting Meters	Elevation Meters	Classification	
											E. Stress						
600 South Alluvium																	
600 S. LAB OEDOMETER	06SB135	3	200	60	14	0.927	0.47	0.2439	37	15	2	-53.13	56173.76	49340.72	1288.93	Alluvium	
600 S. LAB OEDOMETER	06SB148	3	60	57	11.4	1.366	0.35	0.1479			2.8	25.76	55681.98	48726.39	1287.45	Alluvium	
600 S. LAB OEDOMETER	06WB91	4.3	150	50	14.4	0.873	0.29	0.1548			2.7	-55.03	56178.73	49485.63	1288.12	Alluvium	
600 S. LAB OEDOMETER	06WB95	4.3	110	80	13.9	0.95	0.25	0.13	40	17	2.7	15.29	55768.65	48299.94	1290.47	Alluvium	
600 S. LAB OEDOMETER	06WB96	4.3	140	77	12.6	1.16	0.38	0.18	47	16	4.4	15.15	55767.39	48406.79	1290.87	Alluvium	
600 S. LAB OEDOMETER	06WB99	4.3	110	73	10.1	1.69	0.66	0.25	61	26	4.1	-26.22	55689.55	48903.44	1287.82	Alluvium	
600 S. LAB OEDOMETER	09RB26	1.5	78	30	11.8	1.303	0.497	0.216	-		3.2	11.279	51333.45	49074.31	1290.54	Alluvium	
600 S. LAB OEDOMETER	09RB37	1.8	65	30	11.9	1.284	0.345	0.151	69	54	1	2.213	51379.38	49361.32	1290.58	Alluvium	
600 S. LAB OEDOMETER	09SB21	4.6	220	60	14	0.941	0.32	0.165	44	19	1.3	0.281	51308.15	48991.83	1290.06	Alluvium	
600 S. LAB OEDOMETER	09SB22	1.5	73	25	12.2	1.227	0.367	0.165			1.4	4.623	51292.42	48876.04	1290.1	Alluvium	
600 S. LAB OEDOMETER	09SB22	4.6	105	60	12.8	1.123	0.217	0.102	-		1.9	4.623	51292.42	48876.04	1290.1	Alluvium	
600 S. LAB OEDOMETER	09SB39	3	130	55	14.7	0.849	0.201	0.109	32	15	1.7	-				Alluvium	
600 S. LAB OEDOMETER	09SBO4	3	170	60	15.9	0.709	0.219	0.128			2.2	-20.721	51334.73	48383.48	1293.07	Alluvium	
600 S. LAB OEDOMETER	09SBO8	3	160	60	15.1	0.8	0.232	0.129	-		2.6	28.648	51295.79	48425.59	1292.16	Alluvium	
600 South																	
Upper Bonniville																	
600 S. LAB OEDOMETER	06RB01	8.5	98	98	11.3	1.387	0.654	0.2739	47	25	4	-0.01	55054.01	49294.91	1289.18	Upper Bonniville	
600 S. LAB OEDOMETER	06RB05	10.1	140	213	12.5	1.158	0.48	0.2224	45	22	3.8	-8.16				1291.1	Upper Bonniville
600 S. LAB OEDOMETER	06RB18	10.7	100	145	9.8	1.703	0.57	0.2109	51	13	2	-0.2	57319.09	49539.32	1289.87	Upper Bonniville	
600 S. LAB OEDOMETER	06SB19	9.1	140	125	11.5	1.346	0.47	0.2004	54	24	2	-32.54	57045.51	49508.25	1287.5	Upper Bonniville	
600 S. LAB OEDOMETER	06SB28	9.1	135	120	10.4	1.594	0.61	0.2352			3.5	-41.45	56565.98	49478.63	1288.76	Upper Bonniville	
600 S. LAB OEDOMETER	06SB35	7.6	140	9.6	1.81	1.03	0.3665	68	36	2.8	41.14	56515.69	49551.66	1289.27	Upper Bonniville		
600 S. LAB OEDOMETER	06SB36	7.6	152	11.6	1.326	0.51	0.2193	46	22	3	-149.79	55334.91	48209.47	1292.19	Upper Bonniville		
600 S. LAB OEDOMETER	06SB105	7.6	100	84	10	1.698	0.79	0.2928	60	25	3.5	121.16	55854.78	49220.22	1287.75	Upper Bonniville	
600 S. LAB OEDOMETER	06SB135	9.1	100	88	10.4	1.594	0.74	0.2853			3.8	-53.13	56173.76	49340.72	1288.93	Upper Bonniville	
600 S. LAB OEDOMETER	06SB148	6.1	80	80	9.8	1.753	0.76	0.2761			2.5	25.76	55810.98	48726.39	1287.45	Upper Bonniville	
600 S. LAB OEDOMETER	06SB151	11.9	210	247	14.4	0.873	0.27	0.1441	45	22	2	18.98	55756.97	48705.56	1289.25	Upper Bonniville	
600 S. LAB OEDOMETER	06SB176	7.6	100	96	12.5	1.158	0.46	0.2131			3.8	-96.9	55316.27	49114.68	1287.91	Upper Bonniville	
600 S. LAB OEDOMETER	06SB184	6.1	105	105	12	1.248	0.49	0.2118	54	28	2.2	72.02	55756.82	49101.07	1287.68	Upper Bonniville	
600 S. LAB OEDOMETER	06SB186	9.1	215	215	11.9	1.267	0.54	0.2382			3.8	-3.55				1293.3	Upper Bonniville
600 S. LAB OEDOMETER	06SB173	10.7	210	210	13.7	0.969	0.27	0.1371			3	-34.62	55392.27	49170.17	1295.79	Upper Bonniville	
600 S. LAB OEDOMETER	06WB99	7.3	170	102	10.8	1.498	0.69	0.2762			3.7	-26.22	55689.55	48903.44	1287.82	Upper Bonniville	
600 S. LAB OEDOMETER	06SB162	6.1	210	83	11.8	1.3	0.47	0.21	54	22	1.5	35.12	55272.66	49256.47	1288.2	Upper Bonniville	
600 S. LAB OEDOMETER	06SB181	6.1	190	95	14.2	0.91	0.25	0.13	44	16	1.3	-38.96	55803.45	49231.39	1287.89	Upper Bonniville	
600 S. LAB OEDOMETER	06SB25	10.7	200	127	13.6	1	0.33	0.16	33	11	3.1	30.13	55843.91	49317.84	1288.39	Upper Bonniville	
600 S. LAB OEDOMETER	06SB105	7.6	100	84	10	1.72	0.79	0.29	60	25	4.2	121.16	55854.78	49220.22	1287.75	Upper Bonniville	
600 S. LAB OEDOMETER	06SB119	10.5	140	105	11.6	1.34	0.46	0.2	41	17	4.8	39.75	55685.49	49275.51	1288.4	Upper Bonniville	
600 S. LAB OEDOMETER	06SB135	9.1	100	88	10.4	1.61	0.72	0.28	63	33	3.8	-53.13	56173.76	49340.72	1288.93	Upper Bonniville	
600 S. LAB OEDOMETER	06SB154	6.1	100	66	10.1	1.69	0.86	0.32	63	34	3.5	-22.66	55723.93	48741.02	1287.53	Upper Bonniville	
600 S. LAB OEDOMETER	06SB160	7.6	200	92	13.3	1.04	0.35	0.17	41	18	4	79.2	55391.34	49283.62	1288.04	Upper Bonniville	
600 S. LAB OEDOMETER	06SB166	6.1	190	71	11.7	1.32	0.52	0.22	53	27	2.1	34.9	55430.22	49237.34	1288.09	Upper Bonniville	
600 S. LAB OEDOMETER	06SB166	9.1	160	114	12.7	1.14	0.4	0.19	36	13	3.5	34.9	55430.22	49237.34	1288.09	Upper Bonniville	
600 S. LAB OEDOMETER	06WB89	8.8	210	100	12	1.26	0.48	0.21	-		3.2	49.92	55934.29	49369.05	1289.93	Upper Bonniville	

Type of Data and Location	Boring	Depth (m)	Preconsol. Pressure (kPa)	Effective Vertical Stress(kPa)	Dry Density (kNm/M^3)	Initial Void Ratio	Field Cc	Field Cf	Liquid Limit	Plastic Index	%Strain @ Ver	Offset Meters	Northing Meters	Easting Meters	Elevation Meters	Classification
											E. Stress					
600 S. LAB OEDOMETER	06WB91	7.3	140	83	10.9	1.49	0.62	0.25	48	20	3.7	-55.03	56718.73	49485.63	1288.12	Upper Bonniville
600 S. LAB OEDOMETER	09RB11	6.1	110	77	16	0.698	0.209	0.123	27	9	3.3	10.225	51303.57	48540.78	1293.58	Upper Bonniville
600 S. LAB OEDOMETER	09RB14	6.1	100	65	11.9	1.284	0.384	0.168	70	45	2.3	-10.194	51320.7	48656.01	1292.93	Upper Bonniville
600 S. LAB OEDOMETER	09RB14	7.6	140	140	15.7	0.731	0.132	0.076	39	17	2.9	-10.194	51320.7	48656.01	1292.93	Upper Bonniville
600 S. LAB OEDOMETER	09RB26	6.1	100	100	14.1	0.927	0.254	0.132	36	18	3.6	11.279	51333.45	49074.31	1290.54	Upper Bonniville
600 S. LAB OEDOMETER	09RBI 1	9.1	100	100	14.3	0.9	0.217	0.114	42	16	3.7	10.225	51303.57	48540.78	1293.58	Upper Bonniville
600 S. LAB OEDOMETER	09SB21	6.1	205	75	14.2	0.914	0.247	0.129	-	-	3.7	0.281	51308.15	48991.83	1290.06	Upper Bonniville
600 S. LAB OEDOMETER	09SB22	7.6	100	85	10.8	1.516	0.503	0.2	46	17	3.6	4.623	51292.42	48876.04	1290.1	Upper Bonniville
600 South																
Interbeds																
600 S. LAB OEDOMETER	06RB13	13.7	180	217	10.5	1.569	0.51	0.1985	76	33	4	-16.29	56656.35	49519.18	1293.74	Interbeds
600 S. LAB OEDOMETER	06RC09	13.7	200	299	12.4	1.176	0.44	0.2022	50	28	3.5	39.15				1287.5 Interbeds
600 S. LAB OEDOMETER	06SB81	12.2	135	135	12.4	1.176	0.44	0.2022			3	0.37	55113.81	49359.7	1288.13	Interbeds
600 S. LAB OEDOMETER	06SB102	12.2	180	88	12.5	1.158	0.57	0.2641	48	33	4	42.51	55811.05	49105.85	1287.46	Interbeds
600 S. LAB OEDOMETER	06SB169	13.7	205	205	13	1.075	0.42	0.2024	51	31	4	-40.31	55265.37	49180.91	1293.91	Interbeds
600 S. LAB OEDOMETER	06SB186	13.7	190	12.9	1.091	0.54	0.2582			3.8	-3.55				1293.3 Interbeds	
600 S. LAB OEDOMETER	06SB162	12.2	180	122	13.2	1.06	0.42	0.2	57	35	3.5	35.12	55272.66	49256.47	1288.2 Interbeds	
600 S. LAB OEDOMETER	06SB174	12.2	220	171	11.3	1.4	0.64	0.27	48	24	5.6	-4.61	55413.81	49178.36	1300 Interbeds	
600 S. LAB OEDOMETER	06SB182	13.7	260	160	11.8	1.3	0.78	0.34	50	30	2.6	27.98	55804.27	48804.13	1287.48	Interbeds
600 S. LAB OEDOMETER	06SB184	12.2	200	145	11.5	1.36	0.73	0.31	49	26	2.6	72.98	55756.82	49010.7	1287.68	Interbeds
600 S. LAB OEDOMETER	06SB102	12.2	180	88	12.5	1.17	0.49	0.23	48	33	3.6	42.51	55811.05	49105.85	1287.46	Interbeds
600 S. LAB OEDOMETER	13BB05	13.9	220	140	13.1	1.07	0.35	0.17	-	-	5.2	-	53195.33	50152.59	1290 Interbeds	
600 South																
Lower Bonniville																
600 S. LAB OEDOMETER	06SB61	18	175	174	16.1	0.676	0.16	0.0955			3.5	9.65	55335.95	49496.79	1289.8	Lower Bonniville
600 S. LAB OEDOMETER	06SB69	16.6	280	170	13.4	1.013	0.35	0.1738			3.5	9.65	55335.95	49496.79	1289.8 Lower Bonniville	
600 S. LAB OEDOMETER	06SB106	19.7	240	171	10.8	1.498	0.92	0.3683	47	22	2.8	-9.31	54802.98	49368.04	1288.36	Lower Bonniville
600 S. LAB OEDOMETER	06SB123	15.5	200	275	12	1.248	0.57	0.2535	58	30	2.2	-22.09	55682.14	49210.36	1295.33	Lower Bonniville
600 S. LAB OEDOMETER	06SB135	16.8	250	152	12.9	1.091	0.44	0.2104	65	40	2.8	-53.13	55173.76	49340.72	1288.93	Lower Bonniville
600 S. LAB OEDOMETER	06SB174	16.8	210	204	11.1	1.43	0.71	0.2929	61	30	3.8	-4.61	55413.81	49178.36	1300 Lower Bonniville	
600 S. LAB OEDOMETER	06SB169	16.8	300	252	13.4	1.03	0.39	0.19	36	14	5	-40.31	55265.37	49180.91	1293.91	Lower Bonniville
600 S. LAB OEDOMETER	06SB36	19.8	250	190	8.6	2.16	1.12	0.35	41	19	5	-149.79	55934.91	48209.47	1292.19	Lower Bonniville
600 S. LAB OEDOMETER	06SB66	15.2	250	189	13.8	0.97	0.4	0.2	48	23	4.9	17.56	55321.44	49731.09	1289.61	Lower Bonniville
600 S. LAB OEDOMETER	06SB141	16.6	250	152	12.9	1.11	0.42	0.2	44	19	4.3	-56.84	56347.38	49395.07	1288.43	Lower Bonniville
600 S. LAB OEDOMETER	06SB66	15.2	210	81	15.2	0.79	0.31	0.17	47	27	2.3	34.9	55430.22	49237.34	1288.09	Lower Bonniville
600 S. LAB OEDOMETER	06SB174	18.3	260	227	13.4	1.03	0.4	0.2	47	24	3.3	-4.61	55413.81	49178.36	1300 Lower Bonniville	
600 S. LAB OEDOMETER	06SB186	16.8	400	230	16	0.7	0.29	0.17	35	8	2.8	-3.55	56999.3	49537.45	1293.34	Lower Bonniville
600 S. LAB OEDOMETER	09SB22	22.9	200	174	0.562	0.149	0.095	-	3.8	4.623	51292.42	48876.04	1290.1	Lower Bonniville		
600 S. LAB OEDOMETER	09SB39	18.3	205	185	13.5	1.013	0.346	0.172	-	3.5	-	2.7	15.727	51328.98	48330.75	1293.3 Lower Bonniville
600 South																
Cutter Dam																
600 S. LAB OEDOMETER	06SB49	30.3	340	305	13.3	1.028	0.58	0.2859	49	27	4	-12.91	55107.7	49827.02	1289.39	Cutter Dam
600 S. LAB OEDOMETER	06SB127	33.5	600	375	16.6	0.625	0.621	0.3821	-	2.5	18.22	56192.41	49422.24	1288.92	Cutter Dam	
600 S. LAB OEDOMETER	06SB72	28.7	400	348	15.9	0.71	0.22	0.13	32	16	4.7	-11.23	55348.9	50057.1	1290.34	Cutter Dam

Type of Data and Location	Boring	Depth (m)	Preconsol. Pressure (kPa)	Effective Vertical Stress(kPa)	Dry Density (kN/m ³)	Initial Void Ratio	Field Cc	Field Cf	Liquid Limit	Plastic Index	%Strain @ Ver	Offset Meters	Northing Meters	Easting Meters	Elevation Meters	Classification
											E. Stress					
600 S. LAB OEDOMETER	06SB75	30.2	260	257	13.8	0.97	0.32	0.16	-53	-24	3.6	-11.05	55348.06	50234.22	Cutter Dam	
600 S. LAB OEDOMETER	06SB77	27.1	500	300	12.8	1.12	0.79	0.37	33	14	3.9	4.79	55331.93	50311.21	Cutter Dam	
600 S. LAB OEDOMETER	06SB78	28.7	410	227	14.3	0.9	0.41	0.22	42	22	5.4	-15.8	54732.59	49365.83	Cutter Dam	
600 S. LAB OEDOMETER	06SB127	30.5	580	320	14.2	0.91	0.54	0.28	59	21	5.1	18.22	56192.41	49422.24	Cutter Dam	
600 S. LAB OEDOMETER	06SB127	33.5	730	375	16.6	0.64	0.32	0.2	44	19	2.9	18.22	56192.41	49422.24	Cutter Dam	
600 S. LAB OEDOMETER	06SB138	29	400	260	12.4	1.19	0.64	0.29	55	26	5.8	-36.99	56257.36	49385.8	Cutter Dam	
600 S. LAB OEDOMETER	06SB151	28.7	350	350	12.7	1.14	0.55	0.26	46	23	3.6	18.98	55756.97	48790.56	Cutter Dam	
600 S. LAB OEDOMETER	06SB160	32	410	384	13.2	1.06	0.54	0.26	-	-	3.5	79.2	55391.34	49283.62	Cutter Dam	
600 S. LAB OEDOMETER	06SB176	32	500	372	14.4	0.89	0.43	0.23	39	18	5.3	-96.9	55316.27	49114.68	Cutter Dam	
1300 South																
Alluvium																
1300 S. LAB OEDOMETER	13BB07	3	125	48	9.6	1.83	0.63	0.22	-	-	5.5	-	53644.33	50061.49	1292 Alluvium	
1300 S. LAB OEDOMETER	13BB07	4.6	280	62	16.2	0.68	0.13	0.08	-	-	2.3	-	53644.33	50061.49	1292 Alluvium	
1300 S. LAB OEDOMETER	13BR04	4.72	105	66	10.8	0.999	0.24	0.1201	68	28	0.900901	-40.7	52927.76	49991.75	1290.34 Alluvium	
1300 S. LAB OEDOMETER	13BR14	4.72	76.6	57	13	0.997	0.302	0.1512	-	-	36.3	-	52832.3	50062.4	1290.9 Alluvium	
1300 S. LAB OEDOMETER	13BB03	3.048	26.3	42	12.4	0.992	0.1354	0.068	-	-	2.822581	-	52339.67	49959.54	1288.86 Alluvium	
1300 S. LAB OEDOMETER	13BB16	4.72	196	68	17.2	0.996	0.564	0.2826	-	-	1.10331	-	-	-	Alluvium	
1300 S. LAB OEDOMETER	13BS02	3.2	57.47	41	12.5	0.994	0.12	0.0602	-	-	1.810865	-	-	-	Alluvium	
1300 S. LAB OEDOMETER	13BRO3	3.2	91	49	13.2	1.06	0.31	0.15	-50	-25	2.2	-	52497.58	50072.92	1290 Alluvium	
1300 S. LAB OEDOMETER	13BRO8	1.5	28	39	12.9	1.11	0.26	0.12	-30	-19	4.4	-	53633.76	50092.94	1290 Alluvium	
1300 S. LAB OEDOMETER	13BRO1	3.2	77	48	13.1	1.07	0.27	0.13	-44	-21	3.2	-	52108.81	49979.24	1292 Alluvium	
1300 S. LAB OEDOMETER	13RB03	3	96	48	12.4	1.19	0.33	0.15	-	-	4.2	-	-	-	Alluvium	
1300 South																
Upper Bonniville																
1300 S. LAB OEDOMETER	13BB18	6.25	62.2	72	18.8	0.997	0.104	0.0521	-	-	2.304609	-	-	-	Upper Bonniville	
1300 S. LAB OEDOMETER	13BB09	7.6	72	89	10.8	1.52	0.48	0.19	-	-	6.3	-	53766.36	49848.69	1290 Upper Bonniville	
1300 S. LAB OEDOMETER	13BR14A	7.6	106	89	13	1.09	0.26	0.13	-	-	2.7	-	52861.94	50072.05	1290 Upper Bonniville	
1300 S. LAB OEDOMETER	13BR27A	6.1	81	76	11.5	1.36	0.44	0.19	-	-	7.4	-	53897.29	497736.6	1290 Upper Bonniville	
1300 S. LAB OEDOMETER	13BRO6	7.8	72	91	10.2	1.66	0.58	0.22	-38	-21	6.2	-	53355.57	49988.41	1292 Upper Bonniville	
1300 S. LAB OEDOMETER	13BRO7	7.8	210	91	12.3	1.21	0.31	0.14	-36	-23	1.8	-	53396.46	50114.43	1290 Upper Bonniville	
1300 S. LAB OEDOMETER	13BRO8	6.1	100	76	11.6	1.34	0.44	0.19	-30	-19	6	-	53633.76	50092.94	1290 Upper Bonniville	
1300 S. LAB OEDOMETER	13BRO9	6.3	77	15.6	0.74	0.14	0.08	-37	-21	2.1	-	53603.19	49975.39	1292 Upper Bonniville		
1300 S. LAB OEDOMETER	13BROI	7.8	139	91	11.6	1.34	0.51	0.22	-44	-21	4.4	-	52108.81	49979.24	1292 Upper Bonniville	
1300 S. LAB OEDOMETER	13RB04	10.8	125	115	14.7	0.85	0.22	0.12	-	-	5.2	-	52949.46	49997.25	1290 Upper Bonniville	
1300 South																
Interbeds																
1300 S. LAB OEDOMETER	13BB08	12.2	200	127	12.5	1.17	0.39	0.18	-	-	4.8	-	53650.85	49961.63	1292 Interbeds	
Alluvium																
2400 S. LAB OEDOMETER	24BB02	3.2	170	46	14.9	0.824	0.219	0.12	-	-	1.5	-	49994.06	50055.17	1292 Alluvium	
2400 S. LAB OEDOMETER	24BB15	1.7	85	26	14.8	0.836	0.198	0.108	-	-	1.3	-	50548.93	50092.79	1290 Alluvium	
2400 S. LAB OEDOMETER	24BB23	3.2	175	46	15.2	0.788	0.223	0.125	-47	-23	2.2	-	50350.09	50392.75	1290 Alluvium	
2400 S. LAB OEDOMETER	24BB26	3.2	175	*	15.3	0.776	0.172	0.097	-44	-23	1.7	-	50490.54	50343.39	1290 Alluvium	
2400 S. LAB OEDOMETER	24BR12	3	53	45	15	0.812	0.192	0.106	-	-	2.1	-	50429.7	50146.44	1290 Alluvium	
2400 S. LAB OEDOMETER	24BR14	4.7	250	67	14.9	0.824	0.243	0.133	-	-	2.5	-	50725.06	49927.31	1290 Alluvium	

Type of Data and Location	Boring	Depth (m)	Preconsol. Pressure (kPa)	Effective Vertical Stress(kPa)	Dry Density (kN/m ³)	Initial Void Ratio	Field Cc	Field Cf	Liquid Limit	Plastic Index	%Strain @ Ver	Offset Meters	Northing Meters	Easting Meters	Elevation Meters	Classification
											E. Stress					
2400 S. LAB OEDOMETER	24BR17	1.5	110	34	16.1	0.688	0.172	0.102	-	1.8	-	50259.94	50009.9	1290	Alluvium	
2400 S. LAB OEDOMETER	24BR19	3.1	144	46	16.3	0.667	0.173	0.104	-30	-22	3.6	-	50419.14	49984.61	1290	Alluvium
2400 S. LAB OEDOMETER	24BR21	1.5	110	34	15.1	0.8	0.173	0.096	-	-	1.1	-	50321.99	50206.59	1292	Alluvium
2400 S. LAB OEDOMETER	24BB33	3.2	115	48	16.8	0.617	0.115	0.071	33	22	2.8	-	51616.78	49984.74	1290	Alluvium
2400 S. LAB OEDOMETER	24BR24	3.1	180	45	15.1	0.8	0.157	0.087	-	-	1.6	-	50584.35	50525.44	1292	Alluvium
2400 S. LAB OEDOMETER	24BR25	3.1	145	45	15	0.812	0.232	0.128	-	-	2.6	-	51321.11	50069.66	1290	Alluvium
2400 S. LAB OEDOMETER	24BR27	3.2	70	45	15.2	0.788	0.177	0.099	-35	-19	2.9	-	51421.78	49804.96	1290	Alluvium
2400 S. LAB OEDOMETER	24BR29	3.2	130	45	13.4	0.1028	0.312	0.154	-	-	1.7	-	51623.08	50057.83	1290	Alluvium
2400 S. LAB OEDOMETER	24BRII	4.7	115	67	14.6	0.861	0.225	0.121	-45	-24	3.5	-	50683.47	50172.94	1290	Alluvium
2400 S. LAB OEDOMETER	24BROI	4.6	275	58	16.4	0.657	0.133	0.08	-	-	4.6	-				
2400 S. LAB OEDOMETER	24BS12	1.5	95	24	13.9	0.955	0.229	0.117	-41	-23	1.1	-	51425.14	49810.9	1290	Alluvium
2400 S. LAB OEDOMETER	24BW08A	1.5	190	24	11.7	1.323	0.369	0.159	-	-	0.2	-	51647.2	50152.4	1290	Alluvium
2400 S. LAB OEDOMETER	24BW05	1.5	125	29	14	0.941	0.21	0.108	-	-	0.6	-	50682.42	50325.85	1290	Alluvium
2400 S. LAB OEDOMETER	24BW06	3.2	95	46	12.6	1.157	0.352	0.163	-34	-23	2.2	-	51386.91	50116.34	1290	Alluvium
2400 South																
Upper Bonniville																
2400 S. LAB OEDOMETER	24BB01	9.3	215	105	10	1.717	0.935	0.344	-	-	3.2	-	52304.36	49934.52	1292	Upper Bonniville
2400 S. LAB OEDOMETER	24BB08	6.3	240	72	12.7	1.14	0.424	0.198	-	-	2.7	-	5058.18	50451.16	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BB26	9.3	185	105	13.1	1.074	0.384	0.185	-	-	4.8	-	50490.54	50343.39	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BB29	9.3	230	105	11.3	1.405	0.656	0.273	-51	-26	3.9	-	51412.06	50104.08	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BB31	7.8	245	86	13.8	0.969	0.305	0.155	-	-	2.7	-	51453.57	50053.3	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BR03	6.1	135	72	13.4	1.028	0.268	0.132	-28	-22	2.9	-	50192.55	50096.27	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BR23	6.1	110	68	13.3	1.043	0.161	0.079	-	-	1.1	-	50641.21	50439.45	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BR25	7.6	155	86	12.6	1.157	0.319	0.148	-	-	2.7	-	51321.11	50069.66	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BR29	9.3	170	105	13.3	1.043	0.353	0.173	-52	-32	4.2	-	51623.08	50057.83	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BR34	4.6	250	58	14.6	0.861	0.225	0.121	-31	-18	2.9	-	52050.1	50050.46	1292	Upper Bonniville
2400 S. LAB OEDOMETER	24BRO6	9.2	250	100	14.2	0.914	0.258	0.135	-31	-22	4.2	-	50786.49	49823.77	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BS07	6.3	105	72	11.8	1.303	0.451	0.196	-	-	5	-	50381.15	49944.19	1292	Upper Bonniville
2400 S. LAB OEDOMETER	24BS09	9.2	150	105	12.9	1.106	0.392	0.186	-	-	3.8	-	51349.32	49934.57	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BW08A	7.6	180	86	11.6	1.343	0.494	0.211	-38	-21	3.8	-	51647.2	50152.4	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BW02	7.6	115	86	10.5	1.588	0.637	0.246	-	-	5.3	-	50525.3	49952.69	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BW04	9.3	165	105	15.5	0.753	0.188	0.107	-46	-26	4.3	-	50753.18	50068.94	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BW05	6.1	260	67	13.3	1.043	0.356	0.174	-40	-24	1.9	-	50682.42	50325.85	1290	Upper Bonniville
2400 S. LAB OEDOMETER	24BW06	7.8	225	86	13.4	1.028	0.3	0.148	-48	-25	2.6	-	51386.91	50116.34	1290	Upper Bonniville
2400 S. LAB OEDOMETER	33RB03	6.1	150	77	15.5	0.75	0.16	0.09	27	6	2.7	30.13	47462.86	50139.54	1298.04	Upper Bonniville
2400 South																
Interbeds																
2400 S. LAB OEDOMETER	24BB06	12.4	143	135	11.7	1.323	0.525	0.226	-	-	5.4	-	50622.11	50414.43	1290	Interbeds
2400 S. LAB OEDOMETER	24BB29	13.9	265	145	16.7	0.627	0.086	0.053	-	-	2.4	-	51412.06	50104.08	1290	Interbeds
2400 S. LAB OEDOMETER	33RB03	12.2	160	115	14	0.94	0.21	0.11	27	8	2.7	30.13	47462.86	50139.54	1298.04	Interbeds
Alluvium																
3300 S. LAB OEDOMETER	33RB45	4.6	275	80	13.4	1.03	0.32	0.16	38	17	2.9	-39.59	48962.89	50059.37	1293.22	Alluvium
3300 S. LAB OEDOMETER	33RB55	4.6	160	92	16.1	0.69	0.17	0.1	38	17	2.3	1.32	49328.74	50073.88	1295.13	Alluvium
3300 S. LAB OEDOMETER	33SB33	3	160	46	14.1	0.93	0.44	0.23	39	15	3.5	-38.64	48542.3	50175.16	1292.91	Alluvium

Type of Data and Location	Boring	Depth (m)	Preconsol. Pressure (kPa)	Effective Vertical Stress(kPa)	Dry Density (kN/m ³)	Initial Void Ratio	Field Cc	Field Cf	Liquid Limit	Plastic Index	%Strain @ Ver E. Stress	Offset Meters	Northing Meters	Easting Meters	Elevation Meters	Classification
3300 S. LAB OEDOMETER	33WB36	3	180	51	13.2	1.06	0.38	0.19	41	18	3.7	59.92	48507.25	50282.31	1294.35	Alluvium
3300 S. LAB OEDOMETER	33WBO4	3	610	40	14.9	0.82	0.33	0.18	33	12	1.1	31.45	47552.32	50134-553	1297.55	Alluvium
3300 South																
Upper Bonniville																
3300 S. LAB OEDOMETER	33SB33	6.1	180	122	12.4	1.17	0.386	0.1779	37	14	3	-38.64	48542.3	50175.16	1292.91	Upper Bonniville
3300 S. LAB OEDOMETER	33RB06	6.1	200	120	11.8	1.3	0.66	0.29	47	23	2	-23.41	47489.87	50083.59	1298.57	Upper Bonniville
3300 S. LAB OEDOMETER	33RB42	9.1	225	164	12.5	1.17	0.45	0.21	36	15	3.4	1.02	48761.93	50156.54	1297.98	Upper Bonniville
3300 S. LAB OEDOMETER	33RB50	6.1	550	82	15.1	0.8	0.26	0.14	30	6	2.2	-33.35	49480.26	50035.86	1294	Upper Bonniville
3300 S. LAB OEDOMETER	33RB52	10.7	410	156	13.2	1.06	0.42	0.2	46	20	1.8	1.04	48915.44	50113.63	1296.07	Upper Bonniville
3300 S. LAB OEDOMETER	33RB53	7.6	310	136	13.4	1.03	0.35	0.17	43	22	2.2	-21.55	48872.17	50102.27	1297.08	Upper Bonniville
3300 S. LAB OEDOMETER	33RB53	10.7	440	164	13.7	0.98	0.4	0.2	37	16	2.5	-21.55	48872.17	50102.27	1297.08	Upper Bonniville
3300 S. LAB OEDOMETER	33WB29	7.6	600	142	15.1	0.8	0.08	0.05	NP	NP	1.9	47.88	48389.34	50283.51	1300.41	Upper Bonniville
3300 S. LAB OEDOMETER	33WB29	9.1	390	149	13.5	1.01	0.43	0.21	38	16	3.5	47.88	48389.34	50283.51	1300.41	Upper Bonniville
3300 S. LAB OEDOMETER	33RB55	9.1	400	136	13.8	0.97	0.6	0.3	49	21	3.7	1.32	49328.74	50073.88	1295.13	Upper Bonniville
3300 S. LAB OEDOMETER	33WB36	6.1	180	87	15.1	0.8	0.24	0.13	29	8	3.2	59.92	48507.25	50282.31	1294.35	Upper Bonniville
3300 S. LAB OEDOMETER	33WBO4	6.1	150	64	14.7	0.85	0.3	0.16	28	10	2.3	31.45	47552.32	50134-554	1298.55	Upper Bonniville
3300 South																
Interbeds																
3300 S. LAB OEDOMETER	33RB42	12.2	250	193	14.3	0.9	0.28	0.15	19	5	3.7	1.02	48761.93	50156.54	1297.98	Interbeds
3300 S. LAB OEDOMETER	33SB33	13.7	250	110	10.6	1.56	0.78	0.3	74	42	2	-38.64	48542.3	50175.16	1292.91	Interbeds
3300 South																
Lower Bonniville																
3300 S. LAB OEDOMETER	33SB23	15.2	120	465	14.9	0.811	0.2	0.1104			3.8	19.18	48030.56	50215.56	1307.74	Lower Bonniville
3300 S. LAB OEDOMETER	33RB26	15.2	360	235	12.4	1.18	0.583	0.2674			3.2	43.59	48249.81	50278.59	1305.52	Lower Bonniville
3300 S. LAB OEDOMETER	33RB25	15.2	272	272	12	1.25	0.47	0.2089	50	26	3.8	2.23	48201.01	50232.51	1305.5	Lower Bonniville
3300 S. LAB OEDOMETER	33RB25	22.9	270	268	12.4	1.19	0.18	0.08	28	7	3.5	2.23	48201.01	50232.51	1305.5	Lower Bonniville
3300 S. LAB OEDOMETER	33RB52	21.3	425	254	14	0.94	0.29	0.15	40	19	3	1.04	48915.44	50113.63	1296.07	Lower Bonniville
3300 S. LAB OEDOMETER	33RB55	21.3	470	263	14.5	0.87	0.3	0.16	37	14	3.1	1.32	49328.74	50073.88	1295.13	Lower Bonniville
3300 South																
Cutter Dam																
3300 S. LAB OEDOMETER	33RB26	25.9	210	315	12.8	1.1	0.453	0.2157	41	17	4	43.59	48249.81	50278.59	1305.52	Cutter Dam
3300 S. LAB OEDOMETER	33SB33	30.5	470	276	13.9	0.95	0.42	0.21	43	17	2.4	-38.64	48542.3	50175.16	1292.91	Cutter Dam
3300 S. LAB OEDOMETER	33SB39	24.4	450	225	15.2	0.79	0.18	0.1	30	7	3	38.07	48618.89	50235.02	1294.55	Cutter Dam
900 West																
Alluvium																
900 W LAB OEDOMETER	06RB11	4	230	74	13.3	1.04	0.3	0.15			2.2	-49.82	56125.88	49328.14	1288.89	Alluvium
900 W LAB OEDOMETER	06RB22	3	210	84	13.7	0.98	0.25	0.12	-		3.9					Alluvium
900 W LAB OEDOMETER	06SB133	3	270	57	14.7	0.85	0.27	0.15	42	22	2.9	41.72	56360.11	49503.31	1289.06	Alluvium
Upper Bonniville																
900 W LAB OEDOMETER	06RB17	5	200	93	12.6	1.16	0.34	0.16	41	18	2.5	-39.72	57185.92	49500.42	1287.25	Upper Bonniville
900 W LAB OEDOMETER	06RB18	6.1	220	116	12.4	1.19	0.22	0.1	NP	NP	2.1	-0.2	57319.09	49539.32	1289.87	Upper Bonniville
900 W LAB OEDOMETER	06RB19	9.1	140	125	11.5	1.36	0.48	0.2	54	24	2.9					Upper Bonniville
900 W LAB OEDOMETER	06RB41	7.6	180	98	10.6	1.56	0.9	0.35	45	15	3.3	39.15	55811.96	49071.71	1287.5	Upper Bonniville
900 W LAB OEDOMETER	06RB41	13.6	260	167	10.6	1.56	0.62	0.24	48	28	3.9	39.15	55811.96	49071.71	1287.5	Upper Bonniville

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900 W LAB OEDOMETER	06SB151	8.8	180	110	10.6	1.56	0.77	0.3	56	28	3.4	18.98	55756.97	48790.56	1289.25	Upper Bonniville
900 W LAB OEDOMETER	06SB125	7.6	160	110	13.8	0.97	0.29	0.15	35	12	4.5	47.24	56144.87	49436.9	1289.13	Upper Bonniville
900 W LAB OEDOMETER	06SB151	11.9	290	247	14.4	0.89	0.27	0.14	45	22	3.8	18.98	55756.97	48790.56	1289.25	Upper Bonniville
900 W LAB OEDOMETER	06SB156	7.6	200	98	14.2	0.91	0.26	0.14	42	19	2.4	54	55305.09	49269.26	1288	Upper Bonniville
900 W LAB OEDOMETER	06SB156	13.7	250	142	13.9	0.95	0.57	0.29	56	29	1.8	54	55305.09	49269.26	1288	Upper Bonniville
900 W West																
Interbeds																
900 W LAB OEDOMETER	06RB5	14.6	280	169	11.4	1.38	0.74	0.31	-45	-22	3.6	-8.16	55230.39	49222.04	1291.11	Interbeds
900 West																
Lower Bonniville																
900 W LAB OEDOMETER	06SB105	15.2	270	167	12.8	1.12	0.52	0.24	60	34	2.6	121.16	55354.78	49220.22	1287.75	Lower Bonniville
900 W LAB OEDOMETER	06SB156	22.9	520	262	16.7	0.63	0.14	0.09	NP	NP	2.8	54	55305.09	49269.26	1288	Lower Bonniville
900 W LAB OEDOMETER	06SB160	16.8	210	164	14.9	0.82	0.25	0.14	33	14	3.5	79.2	55391.34	49283.62	1288.04	Lower Bonniville
900 West																
Cutter Dam																
900 W LAB OEDOMETER	06RB41	30.3	110	294	12.5	1.17	0.22	0.1	-	2.1	39.15	55811.96	49071.71	1287.5	Cutter Dam	
900 W LAB OEDOMETER	06SB102	29	1000	245	14.7	0.85	0.56	0.3	-34	-13	5	42.51	55811.05	49105.85	1287.46	Cutter Dam
900 W LAB OEDOMETER	06SB156	29.3	520	327	17	0.6	0.23	0.15	-	-	4.7	54	55305.09	49269.26	1288	Cutter Dam
900 W LAB OEDOMETER	06SB160	25.9	440	244	13.9	0.95	0.46	0.23	58	33	4.7	79.2	55391.34	49283.62	1288.04	Cutter Dam

Appendix 2 – Regression Data

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Type of Data and Location	Boring	Depth (m)	Preconsol. Pressure (kPa)	Effective Vertical Stress(kPa)	Dry Density (kN/mA 3)	Initial Void Ratio	Field Cc	Field CI	Liquid Limit	Plastic Index	%Strain @Ver E. Stress
1300 S. LAB OEDOMETER	13BB03	3.048	26.3	42	12.4	0.992	0.1354	0.068	2.82		
1300 S. LAB OEDOMETER	13BB07	4.6	280	62	16.2	0.68	0.13	0.08	2.30		
1300 S. LAB OEDOMETER	13BB16	4.72	196	68	17.2	0.996	0.564	0.2826	1.10		
1300 S. LAB OEDOMETER	13BB18	6.25	62.2	72	18.8	0.997	0.104	0.0521	2.30		
1300 S. LAB OEDOMETER	13BR04	4.72	105	66	10.8	0.999	0.24	0.1201	68	28	0.90
1300 S. LAB OEDOMETER	13BR14	4.72	76.6	57	13	0.997	0.302	0.1512			1.81
1300 S. LAB OEDOMETER	13BR14A	7.6	106	89	13	1.09	0.26	0.13			2.70
1300 S. LAB OEDOMETER	13BRO3	3.2	91	49	13.2	1.06	0.31	0.15	50	25	2.20
1300 S. LAB OEDOMETER	13BRO7	7.8	210	91	12.3	1.21	0.31	0.14	36	23	1.80
1300 S. LAB OEDOMETER	13BRO9	6.3		77	15.6	0.74	0.14	0.08	37	21	2.10
1300 S. LAB OEDOMETER	13BROI	3.2	77	48	13.1	1.07	0.27	0.13	44	21	3.20
1300 S. LAB OEDOMETER	13BS02	3.2	57.47	41	12.5	0.994	0.12	0.0602			1.81
2400 S. LAB OEDOMETER	24BB01	9.3	215	105	10	1.717	0.935	0.344			3.20
2400 S. LAB OEDOMETER	24BB02	3.2	170	46	14.9	0.824	0.219	0.12			1.50
2400 S. LAB OEDOMETER	24BB08	6.3	240	72	12.7	1.14	0.424	0.198			2.70
2400 S. LAB OEDOMETER	24BB15	1.7	85	26	14.8	0.836	0.198	0.108			1.30
2400 S. LAB OEDOMETER	24BB23	3.2	175	46	15.2	0.788	0.223	0.125	47	23	2.20
2400 S. LAB OEDOMETER	24BB26	3.2	175	*	15.3	0.776	0.172	0.097	44	23	1.70
2400 S. LAB OEDOMETER	24BB29	9.3	230	105	11.3	1.405	0.656	0.273	51	26	3.90
2400 S. LAB OEDOMETER	24BB29	13.9	265	145	16.7	0.627	0.086	0.053			2.40
2400 S. LAB OEDOMETER	24BB31	7.8	245	86	13.8	0.969	0.305	0.155			2.70
2400 S. LAB OEDOMETER	24BB33	3.2	115	48	16.8	0.617	0.115	0.071	33	22	2.80
2400 S. LAB OEDOMETER	24BR03	6.1	135	72	13.4	1.028	0.268	0.132	28	22	2.90
2400 S. LAB OEDOMETER	24BR12	3	53	45	15	0.812	0.192	0.106			2.10
2400 S. LAB OEDOMETER	24BR14	4.7	250	67	14.9	0.824	0.243	0.133			2.50
2400 S. LAB OEDOMETER	24BR17	1.5	110	34	16.1	0.688	0.172	0.102			1.80
2400 S. LAB OEDOMETER	24BR19	3.1	144	46	16.3	0.667	0.173	0.104	30	22	3.60
2400 S. LAB OEDOMETER	24BR21	1.5	110	34	15.1	0.8	0.173	0.096			1.10
2400 S. LAB OEDOMETER	24BR23	6.1	110	68	13.3	1.043	0.161	0.079			1.10
2400 S. LAB OEDOMETER	24BR24	3.1	180	45	15.1	0.8	0.157	0.087			1.60
2400 S. LAB OEDOMETER	24BR25	3.1	145	45	15	0.812	0.232	0.128			2.60
2400 S. LAB OEDOMETER	24BR25	7.6	155	86	12.6	1.157	0.319	0.148			2.70
2400 S. LAB OEDOMETER	24BR27	3.2	70	45	15.2	0.788	0.177	0.099	35	19	2.90

2400 S. LAB OEDOMETER	24BR29	3.2	130	45	13.4	1.028	0.312	0.154	1.70
2400 S. LAB OEDOMETER	24BR34	4.6	250	58	14.6	0.861	0.225	0.121	2.90
2400 S. LAB OEDOMETER	24BRII	4.7	115	67	14.6	0.861	0.225	0.121	3.50
2400 S. LAB OEDOMETER	24BS12	1.5	95	24	13.9	0.955	0.229	0.117	1.10
2400 S. LAB OEDOMETER	24BSO8	9.2	150	105	12.9	1.106	0.392	0.186	3.80
2400 S. LAB OEDOMETER	24BW08A	1.5	190	24	11.7	1.323	0.369	0.159	0.20
2400 S. LAB OEDOMETER	24BW08A	7.6	180	86	11.6	1.343	0.494	0.211	3.80
2400 S. LAB OEDOMETER	24BW05	1.5	125	29	14	0.941	0.21	0.108	0.60
2400 S. LAB OEDOMETER	24BW05	6.1	260	67	13.3	1.043	0.356	0.174	24
2400 S. LAB OEDOMETER	24BW06	3.2	95	46	12.6	1.157	0.352	0.163	23
2400 S. LAB OEDOMETER	24BW06	7.8	225	86	13.4	1.028	0.3	0.148	25
2400 S. LAB OEDOMETER	33RB03	6.1	150	77	15.5	0.75	0.16	0.09	27
2400 S. LAB OEDOMETER	33RB03	12.2	160	115	14	0.94	0.21	0.11	27
3300 S. LAB OEDOMETER	33RB06	6.1	200	120	11.8	1.3	0.66	0.29	47
3300 S. LAB OEDOMETER	33RB25	15.2	272	272	12	1.25	0.47	0.2089	50
3300 S. LAB OEDOMETER	33RB25	22.9	270	268	12.4	1.19	0.18	0.08	28
3300 S. LAB OEDOMETER	33RB26	15.2	360	235	12.4	1.18	0.583	0.2674	7
3300 S. LAB OEDOMETER	33RB26	25.9	210	315	12.8	1.1	0.453	0.2157	26
3300 S. LAB OEDOMETER	33RB42	9.1	225	164	12.5	1.17	0.45	0.21	3.80
3300 S. LAB OEDOMETER	33RB42	12.2	250	193	14.3	0.9	0.28	0.15	2.70
3300 S. LAB OEDOMETER	33RB45	4.6	275	80	13.4	1.03	0.32	0.16	2.20
3300 S. LAB OEDOMETER	33RB50	6.1	550	82	15.1	0.8	0.26	0.14	3.50
3300 S. LAB OEDOMETER	33RB52	10.7	410	156	13.2	1.06	0.42	0.2	2.00
3300 S. LAB OEDOMETER	33RB52	21.3	425	254	14	0.94	0.29	0.15	3.20
3300 S. LAB OEDOMETER	33RB53	7.6	310	136	13.4	1.03	0.35	0.17	4.00
3300 S. LAB OEDOMETER	33RB53	10.7	440	164	13.7	0.98	0.4	0.21	3.40
3300 S. LAB OEDOMETER	33RB55	4.6	160	92	16.1	0.69	0.17	0.1	3.70
3300 S. LAB OEDOMETER	33RB55	9.1	400	136	13.8	0.97	0.6	0.3	2.90
3300 S. LAB OEDOMETER	33SB55	21.3	470	263	14.5	0.87	0.3	0.16	2.20
3300 S. LAB OEDOMETER	33SB55	15.2	120	465	14.9	0.811	0.2	0.1104	2.50
3300 S. LAB OEDOMETER	33SB33	3	160	46	14.1	0.93	0.44	0.23	1.80
3300 S. LAB OEDOMETER	33SB33	6.1	180	122	12.4	1.17	0.386	0.1779	2.30
3300 S. LAB OEDOMETER	33SB33	13.7	250	110	10.6	1.56	0.78	0.3	3.00
3300 S. LAB OEDOMETER	33SB33	30.5	470	276	13.9	0.95	0.42	0.21	3.50
3300 S. LAB OEDOMETER	33SB39	24.4	450	225	15.2	0.79	0.18	0.1	1.90
3300 S. LAB OEDOMETER	33WB29	7.6	600	142	15.1	0.8	0.08	0.05	3.50
3300 S. LAB OEDOMETER	33WB29	9.1	390	149	13.5	1.01	0.43	0.21	3.80

3300 S. LAB OEDOMETER	33WB36	3	180	51	13.2	1.06	0.38	0.19	18
3300 S. LAB OEDOMETER	33WB36	6.1	180	87	15.1	0.8	0.24	0.13	29
3300 S. LAB OEDOMETER	33WBO4	3	610	40	14.9	0.82	0.33	0.18	33
3300 S. LAB OEDOMETER	33WBO4	6.1	150	64	14.7	0.85	0.3	0.16	28
600 S. LAB OEDOMETER	06RB01	8.5	98	98	11.3	1.387	0.654	0.2739	47
600 S. LAB OEDOMETER	06RB05	10.1	140	213	12.5	1.158	0.48	0.2224	45
600 S. LAB OEDOMETER	06RB13	13.7	180	217	10.5	1.569	0.51	0.1985	76
600 S. LAB OEDOMETER	06RB18	10.7	100	145	9.8	1.703	0.57	0.2109	51
600 S. LAB OEDOMETER	06RC09	13.7	200	299	12.4	1.176	0.44	0.2022	50
600 S. LAB OEDOMETER	06SB102	12.2	180	88	12.5	1.158	0.57	0.2641	48
600 S. LAB OEDOMETER	06SB105	7.6	100	84	10	1.698	0.79	0.2928	60
600 S. LAB OEDOMETER	06SB106	19.7	240	171	10.8	1.498	0.92	0.3683	47
600 S. LAB OEDOMETER	06SB123	15.5	200	275	12	1.248	0.57	0.2535	58
600 S. LAB OEDOMETER	06SB127	33.5	600	375	16.6	0.625	0.621	0.3821	48
600 S. LAB OEDOMETER	06SB135	3	200	60	14	0.927	0.47	0.2439	37
600 S. LAB OEDOMETER	06SB135	9.1	100	88	10.4	1.594	0.74	0.2853	37
600 S. LAB OEDOMETER	06SB135	16.8	250	152	12.9	1.091	0.44	0.2104	65
600 S. LAB OEDOMETER	06SB148	3	60	57	11.4	1.366	0.35	0.1479	40
600 S. LAB OEDOMETER	06SB148	6.1	80	80	9.8	1.753	0.76	0.2761	22
600 S. LAB OEDOMETER	06SB151	11.9	210	247	14.4	0.873	0.27	0.1441	45
600 S. LAB OEDOMETER	06SB162	6.1	210	83	11.8	1.3	0.47	0.21	54
600 S. LAB OEDOMETER	06SB162	12.2	180	122	13.2	1.06	0.42	0.2	57
600 S. LAB OEDOMETER	06SB162	13.7	205	205	13	1.075	0.42	0.2024	51
600 S. LAB OEDOMETER	06SB173	10.7	210	210	13.7	0.969	0.27	0.1371	31
600 S. LAB OEDOMETER	06SB174	16.8	210	204	11.1	1.43	0.71	0.2921	30
600 S. LAB OEDOMETER	06SB176	7.6	100	96	12.5	1.158	0.46	0.2131	35
600 S. LAB OEDOMETER	06SB181	6.1	190	95	14.2	0.91	0.25	0.13	44
600 S. LAB OEDOMETER	06SB182	13.7	260	160	11.8	1.3	0.78	0.34	50
600 S. LAB OEDOMETER	06SB184	6.1	105	105	12	1.248	0.49	0.218	54
600 S. LAB OEDOMETER	06SB184	12.2	200	145	11.5	1.36	0.73	0.31	26
600 S. LAB OEDOMETER	06SB186	9.1	215	215	11.9	1.267	0.54	0.2382	48
600 S. LAB OEDOMETER	06SB186	13.7	190	190	12.9	1.091	0.54	0.2582	31
600 S. LAB OEDOMETER	06SB19	9.1	140	125	11.5	1.346	0.47	0.2004	54
600 S. LAB OEDOMETER	06SB25	10.7	200	127	13.6	1	0.33	0.16	33
600 S. LAB OEDOMETER	06SB28	9.1	135	120	10.4	1.594	0.61	0.2352	46
600 S. LAB OEDOMETER	06SB35	7.6	140	140	9.6	1.81	1.03	0.3665	68
600 S. LAB OEDOMETER	06SB36	7.6	152	152	11.6	1.326	0.51	0.2193	22

600 S. LAB OEDOMETER	06SB49	30.3	340	305	13.3	1.028	0.58	0.2859	49	27	4.00
600 S. LAB OEDOMETER	06SB61	18	175	174	16.1	0.676	0.16	0.0955			3.50
600 S. LAB OEDOMETER	06SB69	16.6	280	170	13.4	1.013	0.35	0.1738			3.50
600 S. LAB OEDOMETER	06SB75	30.2	260	257	13.8	0.97	0.32	0.16			3.60
600 S. LAB OEDOMETER	06SB77	27.1	500	300	12.8	1.12	0.79	0.37			3.90
600 S. LAB OEDOMETER	06SB81	12.2	135	135	12.4	1.176	0.44	0.2022			3.00
600 S. LAB OEDOMETER	06SB102	12.2	180	88	12.5	1.17	0.49	0.23			3.60
600 S. LAB OEDOMETER	06SB127	33.5	730	375	16.6	0.64	0.32	0.2			2.90
600 S. LAB OEDOMETER	06SB135	9.1	100	88	10.4	1.61	0.72	0.28			3.80
600 S. LAB OEDOMETER	06SB151	28.7	350	350	12.7	1.14	0.55	0.26			3.60
600 S. LAB OEDOMETER	06SB154	6.1	100	66	10.1	1.69	0.86	0.32			3.50
600 S. LAB OEDOMETER	06SB160	7.6	200	92	13.3	1.04	0.35	0.17			4.00
600 S. LAB OEDOMETER	06SB160	32	410	384	13.2	1.06	0.54	0.26			3.50
600 S. LAB OEDOMETER	06SB166	6.1	190	71	11.7	1.32	0.52	0.22			2.10
600 S. LAB OEDOMETER	06SB166	9.1	160	114	12.7	1.14	0.4	0.19			3.50
600 S. LAB OEDOMETER	06SB166	15.2	210	81	15.2	0.79	0.31	0.17			2.30
600 S. LAB OEDOMETER	06SB174	18.3	260	227	13.4	1.03	0.4	0.2			3.30
600 S. LAB OEDOMETER	06SB186	16.8	400	230	16	0.7	0.29	0.17			2.80
600 S. LAB OEDOMETER	06WB89	8.8	210	100	12	1.26	0.48	0.21			3.20
600 S. LAB OEDOMETER	06WB91	4.3	150	50	14.4	0.873	0.29	0.1548			2.70
600 S. LAB OEDOMETER	06WB91	7.3	140	83	10.9	1.49	0.62	0.25			3.70
600 S. LAB OEDOMETER	06WB95	4.3	110	80	13.9	0.95	0.25	0.13			2.70
600 S. LAB OEDOMETER	06WB99	7.3	170	102	10.8	1.498	0.69	0.2762			3.70
600 S. LAB OEDOMETER	09RB11	6.1	110	77	16	0.698	0.209	0.123			3.30
600 S. LAB OEDOMETER	09RB14	6.1	100	65	11.9	1.284	0.384	0.168			2.30
600 S. LAB OEDOMETER	09RB14	7.6	140	140	15.7	0.731	0.132	0.076			2.90
600 S. LAB OEDOMETER	09RB26	1.5	78	30	11.8	1.303	0.497	0.216			3.20
600 S. LAB OEDOMETER	09RB26	6.1	100	100	14.1	0.927	0.254	0.132			3.60
600 S. LAB OEDOMETER	09RB37	1.8	65	30	11.9	1.284	0.345	0.151			1.00
600 S. LAB OEDOMETER	09RB37	9.1	100	100	14.3	0.9	0.217	0.114			3.70
600 S. LAB OEDOMETER	09SB21	4.6	220	60	14	0.941	0.32	0.165			1.30
600 S. LAB OEDOMETER	09SB21	6.1	205	75	14.2	0.914	0.247	0.129			3.70
600 S. LAB OEDOMETER	09SB22	1.5	73	25	12.2	1.227	0.367	0.165			1.40
600 S. LAB OEDOMETER	09SB22	4.6	105	60	12.8	1.123	0.217	0.102			1.90
600 S. LAB OEDOMETER	09SB22	7.6	100	85	10.8	1.516	0.503	0.2			3.60
600 S. LAB OEDOMETER	09SB22	22.9	200	200	17.4	0.562	0.149	0.095			3.80
600 S. LAB OEDOMETER	09SB39	3	130	55	14.7	0.849	0.201	0.109			1.70

600 S. LAB OEDOMETER	09SB39	18.3	18.3	450	160	15.4	0.765	0.296	0.168
600 S. LAB OEDOMETER	09SBO2	3	3	170	60	15.9	0.709	0.219	0.128
600 S. LAB OEDOMETER	09SBO4	3	3	160	60	15.1	0.8	0.232	0.129
600 S. LAB OEDOMETER	09SBO8	3	3	230	74	13.3	1.04	0.3	0.15
900 W. LAB OEDOMETER	06RB11	4	4	200	93	12.6	1.16	0.34	0.16
900 W. LAB OEDOMETER	06RB17	5	5	220	116	12.4	1.19	0.22	0.1
900 W. LAB OEDOMETER	06RB18	6.1	6.1	140	125	11.5	1.36	0.48	0.2
900 W. LAB OEDOMETER	06RB19	9.1	9.1	210	84	13.7	0.98	0.25	0.12
900 W. LAB OEDOMETER	06RB22	3	3	180	98	10.6	1.56	0.9	0.35
900 W. LAB OEDOMETER	06RB41	7.6	7.6	260	167	10.6	1.56	0.62	0.24
900 W. LAB OEDOMETER	06RB41	13.6	13.6	110	294	12.5	1.17	0.22	0.1
900 W. LAB OEDOMETER	06RB41	30.3	30.3	280	169	11.4	1.38	0.74	0.31
900 W. LAB OEDOMETER	06RB5	14.6	14.6	180	110	10.6	1.56	0.77	0.3
900 W. LAB OEDOMETER	06SB151	8.8	8.8	270	167	12.8	1.12	0.52	0.24
900 W. LAB OEDOMETER	06SB105	15.2	15.2	270	57	14.7	0.85	0.27	0.15
900 W. LAB OEDOMETER	06SB133	3	3	290	247	14.4	0.89	0.27	0.14
900 W. LAB OEDOMETER	06SB151	11.9	11.9	200	98	14.2	0.91	0.26	0.14
900 W. LAB OEDOMETER	06SB156	7.6	7.6	250	142	13.9	0.95	0.57	0.29
900 W. LAB OEDOMETER	06SB156	13.7	13.7	520	262	16.7	0.63	0.14	0.09
900 W. LAB OEDOMETER	06SB160	22.9	22.9	210	164	14.9	0.82	0.25	0.14
		16.8						33	14
									3.50
									3.50
									2.70
									2.20
									2.60
									2.20
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